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INFANT FEEDING IN NORTH AMERICA, 1880-1920:
THE PHYSICIAN-NURSE RELATIONSHIP

by

Ⓒ JUDITH O'HEIR

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
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ABSTRACT

The subject of this study is infant feeding in North America from 1880 to 1920, based on an historical description and analysis of the development of milk substitutes and other medical interventions aimed at resolving the infant feeding problem, with consideration of the relative contributions and relationships of the medical and nursing professions.

The study required an analysis of medical and nursing literature in relation to infant feeding for the period 1880 to 1920. Additionally, selected references were used to provide background information regarding the general social structure of late nineteenth and early twentieth century North America and the organization and development of the medical and nursing professions at that time.

The conclusions reached as a result of this study are that, on the whole, the methods of intervention developed by physicians to overcome the infant feeding problem were of benefit to only the wealthier classes; secondly, the interventions appear to have placed infant feeding in the hands of the medical profession and subsequently facilitated the establishment of paediatrics as a medical specialty, thus placing child health care under medical jurisdiction. However, from the evidence examined, it cannot be determined whether this development was the goal of the medical profession or whether it happened as a natural consequence of medical involvement in infant feeding. Further to this, it cannot be concluded from the present study that, with respect to their involvement in infant feeding, nurses and nursing were exploited by physicians. Rather, it appears that physician dominance in relation to infant feeding was fully supported

by nurses, thus indirectly facilitating the development of the medical profession but not necessarily in a manner detrimental to the development of the nursing profession.

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CHAPTER I

INTRODUCTION

An analysis of the late nineteenth and early twentieth century North American medical and nursing literature reveals that infant feeding at the time was an immensely serious problem. Prior to the Industrial Revolution, breast feeding was the normal method of infant feeding.[1] However, the rapid urbanization introduced by industrialization led to marked changes in the way people lived. For the less fortunate classes of society, housing conditions were deplorable and personal and communal standards of hygiene were either very low or nonexistent. Forced to depend on a market economy, some women were compelled to work outside of their homes, making it difficult, if not impossible, for them to breast feed their infants. Additionally, some women from the more fortunate classes chose not to breast feed in order to pursue freedom from domestic imprisonment. Thus, with a decline in breast feeding, there was a concomitant increase in the number of infants being artificially fed and a subsequent rise in the number of infants dying during their first year of life. Although during the latter part of the nineteenth century, improvements in housing and sanitation standards and the introduction of infectious disease controls were thought to have brought about a reduction in general mortality rates, at the close of the century, infant mortality rates remained alarmingly high. As indicated in the medical and nursing literature, opinion held that there was a strong association between artificial feeding and the excessive number of infant deaths. Notwithstanding impoverished environmental conditions, which undoubtedly contributed to the high infant death toll, the diet—contaminated cow's milk, for instance—of those infants who were not breast fed was considered one of the most influential factors leading to death in infancy. Little was known about the nutritional needs of infants, and even less knowledge was available regarding the aetiology and treatment of most nutrition related diseases of infancy. Hence, for those physicians involved in infant health care, becoming "infant feeders"[2] was of vital importance.

Although both physicians and nurses encouraged women to breast feed, development directed towards providing a suitable substitute for breast feeding became the prerogative of the medical profession, thus limiting the input of nurses by subjecting their involvement in the infant feeding problem to the control of physicians. However, despite agreement among physicians that a pure milk supply was the keynote to successful artificial infant feeding, medical intervention fell far short of solving the infant feeding problem. Despite the knowledge, common to most physicians of the day, that the milk supply was heavily contaminated with bacteria, initially there was very little done to ensure that pure milk was available on a widespread basis for infant feeding. On the contrary, measures of remediation developed by physicians with a view to improving artificial infant feeding were of benefit to only a small percentage of the population. The fact that infants in all classes of society were in need of properly modified pure milk, was for years given limited attention by many members of the medical profession. The predominant interest of physicians, evident in both the medical and nursing literature, appeared to lie in becoming established as primary authorities in all aspects of infant feeding, rather than in developing methods which would give the majority of mothers access to suitable milk for infant feeding. Not until well into the twentieth century when inexpensive pure milk was made available on a widespread basis, as a result of philanthropic interest, was there a significant and consistent decline in infant death rates. Nonetheless, physicians had by this stage established themselves as authorities in matters of infant feeding, and although trained nurses were very much involved with infant care, the insistence of physicians that they were less competent than themselves so far as infant feeding was concerned helped to keep nurses in a subordinate role. However, in many respects nurses were no less competent than were physicians, contributing to the care and feeding of infants in an active and important manner.

The present study constitutes an historical description and analysis of the development of milk substitutes and other medical interventions aimed at resolving the infant feeding problem, with consideration of the relative contributions and relationships of the medical and nursing professions.

Since infant feeding was a major focus of attention for physicians, they produced an abundance of literature related to the topic. While physicians made the decisions regarding what should be done to overcome the infant feeding problem, nurses attended to the practical tasks designated them by the medical decision makers. Although nurses also wrote about infant feeding, the nursing literature on the topic is less abundant and deals almost exclusively with the practical nature of nursing involvement, but at the same time demonstrates clearly the controlling influence of physicians over nurses' work. For these reasons, it appears appropriate to begin with an analysis of the medical literature, followed then by an analysis of the nursing literature.

However, before doing so, it should be made clear that a study of this nature contains those limitations common to most historical research.[3]

Notes to Chapter I

1 Derrick B. Jelliffe and E. F. Patrice Jellife, Human Milk in the Modern World: Psychosocial, Nutritional, and Economic Significance (New York: Oxford University Press, 1978), p. 182.

2 Although physicians were not noted for their involvement in the act of bottle feeding babies, they not infrequently used this term to describe themselves. For example, see Thomas Morgan Rotch, "The Essential Principles of Infant Feeding and the Modern Methods of Applying Them," Journal of the American Medical Association 41 (August 1903): 421; Roger H. Dennett, "The Caloric Requirements of Bottle-Fed Infants," Journal of the American Association 59 (December 1912): 2306; Lewis Webb Hill, "A Critical Discussion of Certain Phases in the Development of Modern Infant Feeding: Their Influence Upon Present Teachings," Boston Medical and Surgical Journal 182 (March 1920): 313. Additionally, to physicians, the term infant feeding "usually meant the nourishment, during the first year of life, of infants who [were] deprived of the maternal breast." See L. Emmett Holt, "Where Does the Medical Profession Stand Today Upon the Question of Infant Feeding?" Archives of Paediatrics 14 (November 1897): 816.

3 To some extent the literature reflects certain opinions, both of class and geographical origins. For example, the opinions of physicians and nurses reflected in the literature may not necessarily represent the opinions of all physicians and nurses practicing at the time. In addition, infant feeding as described in North America from 1880 to 1920 does not permit generalizations to be made to other continents or other time periods.

CHAPTER II

THE MEDICAL PERSPECTIVE

Introduction

In order to understand the actions of physicians in relation both to infant feeding and to the establishment of paediatrics as a medical speciality, it is necessary to begin by having some idea of how the medical profession in North America was organized by the 1880s. First, medical education was poorly regulated, lacked standardization, and was decades away from establishing a sound scientific basis for practice.[1] Additionally, North American medical science lagged far behind that in Europe, and medical education was so unscientific that physicians were unable to understand or evaluate the scientific discoveries being made in some of the European countries. It was not until the beginning of the twentieth century, when the scientific basis of medicine was becoming emphasized by medical schools in the United States, that Americans began to contribute to the expansion of scientific medical knowledge;[2] and at that time, medical research in Canada was at an early stage of development,[3] although medical advances made in other countries were followed by the profession in the numerous medical journals[4] published throughout North America.

The nineteenth century American medical school curriculum covered three broad fields: the basic sciences, the theory and diagnosis of disease, and the treatment of disease. The most basic of the sciences was chemistry; however, even in subjects such as this, clinical, tutorial or laboratory instruction was rare. The most basic of the medical sciences were anatomy and physiology, the greatest disadvantage with these courses being that they were usually taught by practitioners, who had limited knowledge of or interest in the subject, rather than by trained anatomists and physiologists, who at the time were few in number. Additionally, because both histology and bacteriology were in their infancy, and because during the course of education the microscope was rarely used, the study of the aetiology and diagnosis of disease lacked the advantages of microscopic scientific observation.[5]

Traditionally, all American medical schools had emphasized a practical, clinically oriented program of education. The major problem with this clinically oriented education is said to have been absence of a "thorough grounding in anatomy, physiology, pathology, and therapeutics."[6] The basic scientific courses were poorly structured and provided insufficient laboratory instruction. In addition to these inadequacies was the poor bedside clinical training common to almost all medical schools. The clinical teaching was usually done in hospitals unaffiliated with the medical school. Even though unqualified to teach, hospital physicians and surgeons were often placed on the medical school faculties to insure harmonious relations. Moreover, in the hospital setting, clinical teaching was considered to be a secondary activity, thus adding to the inferior quality of clinical training.[7]

Even though the profession became organized on a national level with the formation of the American Medical Association in 1847 and the Canadian Medical Association in 1867,[8] it was far from being a well unified body. The lack of a sound scientific basis for practice led to much disagreement among practitioners so far as the appropriateness of therapies was concerned.[9] Although one of the goals shared by the national associations was to elevate the standard of medical education and thus help resolve some of the conflicts experienced in practice, attainment of this goal involved a long and difficult process, and as the well known Flexner report[10] on the state of medical education in the United States and Canada published in 1910 indicated, was far from being realized.

So far as specialization was concerned, a number of conditions had to be fullfilled before a medical speciality could develop. These conditions included the development of a medically valid body of knowledge and techniques related to a given speciality, an urban population large enough to support a specialist in his practice, and organization within the profession which made it financially rewarding for a physician to restrict his practice to a speciality.[11]

Specialists and specialities multiplied during the last decades of the nineteenth century, paediatricians and paediatrics among these. However, traditionally, the problems of infancy and childhood had been dealt with by the departments of medicine or obstetrics and diseases of women. Not until the second half of the nineteenth century, when the physiological and biochemical differences between infants, children and adults were given increased recognition, did the necessity to establish paediatrics as a distinct discipline within the medical profession become obvious.[12] Consequently, toward the end of the nineteenth century, paediatrics was more frequently included in the curriculum of medical schools, more paediatric textbooks were available, the first American paediatric journal was published in 1884, and the American Paediatric Society was founded in 1888.[13] However, notwithstanding these developments, one of the most distinguished paediatricians and infant feeders of the period, Thomas Morgan Rotch, wrote in 1891 that so little had been accomplished regarding the scientific study of the child, physicians undertook the investigation of this special branch of medicine "with the keen interest of explorers in an almost unknown country."[14] Rotch continued by pointing out that not only was there

> a vast expanse of unknown, but that much which was supposed to be known is in reality a poor subterfuge of unreal facts forming structures of misleading results, which in the scientific medicine of adults would not for a second be tolerated.[15]

Not until very late in the nineteenth century and in the beginning of the present century, when a few physicians began devoting exclusive attention to the diseases of children, were the profound physiological, biochemical, and pathological differences between adults and children begun to be appreciated, and then by only a small percentage of all medical practitioners. At the end of the century, not more than half a dozen physicians in the United States practiced paediatrics exclusively, and possibly one physician out of every twenty-five hundred could have been classified as a paediatrician.[16] In 1890, for example, as was later noted by an eminent paediatrician,

> the American Paediatric Society, which included in its membership practically every paediatrician in the United States and Canada, had only forty-nine members. All but seven lived east of Chicago, and none of them limited his practice exclusively to paediatrics.[17]

The initial goal of members of the American Paediatric Society was to develop clinical and scientific acumen in relation to the diseases of infancy and childhood. Thus, for the early members of the society, work along the lines of laboratory and clinical research was of paramount importance.[18] However, since biochemistry in the clinical field was practically unknown in the nineteenth century, the laboratory tools available were limited to bacteriology and pathologic histology.[19] Not until the early years of the present century did some members consider the Society ready to broaden its obligations by grappling with larger problems, for example, of a social nature. Nonetheless, the opinion of members regarding expansion of the Society's work was divided. As another distinguished paediatrician of the period, L. Emmett Holt, suggested, problems of a broader social nature, although of sociologic interest, had no real bearing on the more strictly medical matters with which most paediatricians were concerned.[20]

With regard to nutrition, the nineteenth century physician's understanding of the proper composition of diet is said to have been as "deplorably deficient as was [his] comprehension of public hygiene."[21] Additionally, knowledge based on scientific observation in relation to nutrition was so limited that "those in authority made up their own varying rules, few of proved correctness and some with highly dangerous defects."[22] As late as 1920, a member of the American Paediatric Society wrote that opinions regarding infant feeding were constantly changing and that, at the time, there was "comparatively little [known] about the factors which [were] concerned in the disturbances of digestion and of nutrition."[23]

Thus, having briefly described, for the purposes of the present study, the functional basis of the medical profession and the state of the developing medical speciality, paediatrics, in late nineteenth and early twentieth century North America, it is necessary to examine certain aspects of infant feeding which appear to have facilitated major medical involvement in child health care, an area of health care previously unclaimed by a professional body. To begin, it is important to demonstrate with mortality statistics that the number of infant deaths did represent a serious health problem and that there did appear to be an association between infant deaths and infant feeding. This being the case, it is then necessary to analyze the steps taken by physicians to elevate infant feeding to a "scientific" level, namely, the analysis and comparison of human and cow's milk, the development of the percentage system of feeding, certification, pasteurization and sterilization of milk, and methods of home milk modification. Exploration of these developments indicates the efforts of physicians to solve the infant feeding problem and thus lower infant death rates. Additionally, so as to facilitate broader understanding of the medical profession's involvement in infant feeding, attention is directed to physicians' involvement in maternal nursing, wet nursing, and the use of proprietary infant foods.

Ultimately, the most effective means of dealing with the infant feeding problem on a large scale was the introduction, toward the end of the nineteenth century, of infant milk depots. Although the original milk depots were supported philanthropically and run by nurses, physicians, who by this time deemed themselves emerging experts in matters of infant health care, very quickly became the decision makers in milk depot work. Thus, inclusion of the development of milk depots in the study is essential to understand fully the medical profession's involvement in infant feeding and the consequent impact of that involvement on child health care.

Infant Mortality

Early in the nineteenth century, high infant mortality rates were considered unfortunate but inevitable. The diseases of infancy and childhood presented physicians with "nothing but perplexing obscurity or embarrassing uncertainty."[24] However, beginning in the second half of the century, the value of infant life and the problem of infant mortality were recognized by society in general and physicians in particular. This interest in infant life continued to grow throughout the remainder of the century. As Holt wrote:

> The problem of infant mortality is one of the great social and economic problems of our day. No resources of the State need so much to be conserved as do its children....Of the physical, intellectual and moral strength of the children of today the future depends. In all training and education physical considerations must come first. Unless the infants are saved there will be no children to educate.[25]

Thus, with the increasing value being placed on infant life it was essential that infant mortality be brought under control. Moreover, since so many deaths were feeding-related,[26] the difficulties associated with infant feeding required resolution, and although as already pointed out, medical knowledge related to infant nutrition was limited, physicians took it upon themselves to remedy the infant feeding problem in the hope of decreasing infant mortality.

So far as statistics were concerned, in large urban centers where overcrowding was extreme, housing conditions of the poorer classes, deplorable, and municipal sanitation standards almost nonexistent until the turn of the century, infant mortality rates (the number of deaths under one year of age per 1,000 live births) were inconceivably high.[27] For example, in 1885 there were 9,303 infant deaths (a mortality rate of 273.60) in America's largest urban centre, New York City.[28] During the three years from 1890 to 1892, inclusive, 32,916 or 26 per cent of the total number of deaths in the city occurred during the first year of life.[29] In 1903 there were 14,015 infant deaths or 23 per cent of the total number of deaths. There were 91,895 births in the same year, making the infant mortality rate 152.[30] However, only three years prior to this, in 1900, 106 other American cities and towns reported infant death rates in excess of 175. In nine cases the rate exceeded 300; in 10, it was between 250 and 300; in 38, between 200 and 250; and in 49, between 175 and 200.[31] Although the infant mortality rate for some of the larger American cities did begin declining in the first decade of the twentieth century, this downward trend was not as obvious in Canada, where, in 1913, the recorded infant death rates, regardless of the city's population, all exceeded the reported rate of 102 for New York City. For example, Montreal recorded a rate of 290; Ottawa, 256; Halifax, 204; Hamilton, 173; London, 164; and Toronto, 144.[32]

Diseases leading to death in infancy were usually categorized as contagious, diarrhoeal, respiratory, congenital, or all other causes. Of these, diarrhoeal diseases, which included all intestimal disturbances accompanied by diarrhoea, accounted for more infant deaths than in any other category. For instance, of the 9,309 infant deaths that occurred in New York City in 1885, 2,866 or 30.8 per cent were due to diarrhoeal diseases, while only 708 or 7.6 per cent were due to contagious diseases, 1,436 or 15.4 per cent to respiratory diseases, 1,430 or 15.4 per cent to congenital diseases, and 2,863 or 30.8 per cent to all other causes.[33] Of the 14,015 infant deaths occurring in 1903, 3,769 were ascribed to diarrhoea, that is 26.8 per cent.[34] Additionally, in 1913, of the three major eastern Canadian cities—Toronto, Montreal and Ottawa—deaths due to "digestive troubles" comprised one third to one half of the total infant deaths for these cities.[35] Of course, infant deaths due to diarrhoeal diseases were common not only in American and Canadian cities, but in cities of the British Isles and Europe as well. To illustrate, in France from 1892 to 1897, of each thousand infant deaths, 385 were due to diarrhoeal diseases, while in 42 German cities and towns, of the 67,637 infant deaths that occurred during a one year period beginning in 1905, 28,422 were due to this same cause,[36] and in England and Wales in 1911, no less than 31,900 of the 114,600 infant deaths were included in the diarrhoeal diseases category.[37] It is evident that during the late nineteenth and early twentieth centuries, the loss of infant lives due to diarrhoea was excessive.

Diarrhoeal diseases of infancy, although not unknown among the wealthier classes, were usually associated with poverty, overcrowding, and unhygienic living conditions. However, since pure milk was almost non-existent until toward the end of the nineteenth century, impure milk was thought by most, if not all, physicians dealing with infants to lead to more disease and death among this age group than any other factor. In Rochester, New York, for example, where no systematic attempt was made to improve the milk supply prior to the late 1890s, there were 6,306 infant deaths in the thirteen year period 1884 to 1897. For the thirteen year period from 1897 to 1907, during which a concerted effort was made to improve the municipal milk supply by extending dairy inspection and initiating bacteriological examination of milk, and by establishing summer milk stations for the purpose of distributint pure milk for infant feeding, the number of infant deaths fell to 4,641, a reduction of 26.5 per cent in terms of raw data. Although it was not suggested that the improvements in the milk supply alone were responsible for decreasing infant mortality, they were thought to have played a highly influential role in doing so.[38]

In addition to poverty, overcrowding, unhygienic living conditions, and impure milk—all of which were recognized by physicians as being associated with high infant mortality[39]—hot weather during the summer months was associated with epidemic summer diarrhoea and a related alarming increase in an already excessively high infant death rate. Prolonged exposure to the heat of summer increased the lethality of an already bacteria-laden milk supply, compounding the susceptibility of infants to disease and death. The enormous increase in the number of deaths attributed to diarrhoea during the summer months was clearly demonstrated by Holt in the following graph:

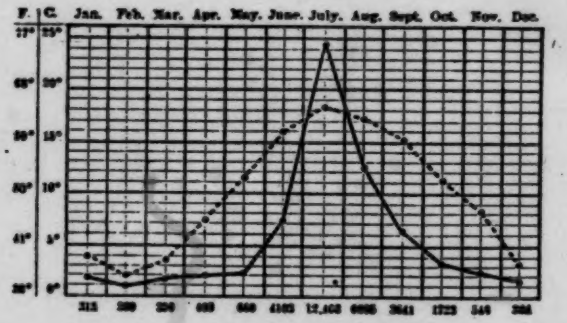

Figure 1. Mortality from diarrhoeal diseases in New York for ten years in children under five; compared with the mean temperature for the same period. ———, mortality; ············, mean temperature.[40]

As may have been expected, diarrhoeal diseases were far more common among bottle fed infants than among those infants fed exclusively at the breast. At the close of the nineteenth century, Holt wrote that in his experience with 1,943 fatal cases of diarrhoea, only three were exclusively breast fed.[41] Nonetheless, it was not bottle feeding as such that was to blame for the prevalence of diarrhoea among artificially fed infants, but rather the manner in which it was practiced. The use of contaminated milk, often prepared in and fed from dirty utensils, made the safe practice of bottle feeding exceedingly difficult if not impossible. As another well known paediatrician of the period, Henry Koplik, said in 1898:

> The great mass of summer diarrhoeas, the fatal gastro-intestinal disorders of infancy and early childhood, and some of the most troublesome diarrhoeas of the winter months are now generally conceded to be due to bacteria and toxins in the milk food of the infant.[42]

While physicians generally agreed that impure milk greatly influenced the prevalence of infant diarrhoea, there was unanimous agreement within the medical profession that the gravity of the diarrhoeal disease problem could best be remedied by application of medical knowledge. Even though by the end of the nineteenth century the scientific basis of medical education and practice was far from being firmly established, there appear to have been few alternatives—save for the philanthropic widespread distribution of clean milk—to medical intervention.

Milk Analysis and the Percentage System

To those late nineteenth century physicians interested in the diseases of childhood, infant feeding was a subject of immense significance. As Holt wrote in 1897, "there is no subject in paediatrics of greater interest and importance than that of infant feeding."[43] While Holt and other physicians agreed that breast milk was the best food for infants,[44] they recognized that not all women nursed their infants. Thus, because infant mortality among non-breast fed infants was so high, development of appropriate artificial infant feeding was, according to physicians, essential if infant lives were to be saved. Artificial feeding, then, became for the medical profession "a subject which must be met and dealt with as any other life-saving question."[45] Hence, the first step in the life-saving process related to, according to another physician, "one of the most complex and fateful problems [infant feeding] in medicine,"[46] was to develop an artificial infant food to closely resemble breast milk. As was said in 1898 by an American paediatrician "the great principle which underlies all practical application in this difficult branch of paediatrics [infant feeding] is an accurate imitation of nature's earliest food for man [human milk]."[47]

Consequently, for those infants not breast fed, most late nineteenth and early twentieth century physicians recommended the substitution of cow's milk modified to resemble closely human milk. The belief that modified cow's milk was a suitable infant food was based on the results of the analysis and comparison of human and cow's milk. Although as early as 1850 the Philadelphia physician, J. R. Meigs, introduced simple cow's milk formulas based on crude milk analyses,[48] it was not until the 1880s that his son, A. V. Meigs, conducted careful chemical analyses of both human and cow's milk. Based on his chemical studies of milk, Meigs intended to develop from cow's milk a food as close in composition to human milk as was possible. He concluded that this could be accomplished by mixing together two parts of cream, one of milk, two of lime water, and three parts of a solution of milk sugar. According to Meigs, this mixture contained "about" four per cent fat, seven per cent sugar and one per cent casein (protein), therefore imitating mother's milk "exactly".[49] Even though Meigs' mixture was found by some physicians to have limitations, his ideas were extensively followed throughout the United States. It was Meigs' chemical analyses of human and cow's milk which served as a basis for modern infant feeding,[50] and ultimately led, as a result of his colleagues' subsequent contributions, to the rise of medical authority in the field. Meigs' work appears to have marked the beginning of the scientific, medical approach to infant feeding, an approach which was destined to help limit the involvement of nurses in the new area of child health care.

In the late 1880s, following in Meigs' footsteps, the Boston paediatrician, Thomas Morgan Rotch,[51] began his work on infant feeding. Although Rotch was said to have given the Meigs' mixture a thorough trial in his work at the Boston Infant's Hospital, he ultimately disagreed with Meigs that human milk invariably contained one per cent protein.[52] From his chemical analyses and clinical observations, Rotch concluded that varying percentages of protein were supplied by different mothers, and in this regard, he said,

> perhaps a dozen human milks might each agree with as many infants, as shown by their perfect nutrition, and yet that any one of these infants' diges-

> tion might be disturbed by the same milk which was being digested perfectly by another.[53]

Since, according to Rotch, one baby might need and digest a higher or lower percentage of protein than another, it was not feasible to give a milk mixture containing the same amount of protein (i.e., one per cent) to all infants. Hence, on this basis, Rotch developed his highly complex and exacting system of percentage feeding. It was his belief that the cause of nutritional disturbances lay in the specific food elements rather than in the diet as a whole; therefore, it was necessary to think of the infant's food in terms of the elements it contained, and adjust these elements as indicated by the infant's reaction to a given formula. Moreover, Rotch felt that it was of the utmost importance to begin with low percentages of all three major constituents of cow's milk—fat, sugar and, in particular, protein—gradually advancing one element at a time so as to have the infant on unmodified milk by the eleventh or twelfth month. The percentage system, then, involved the preparation of an almost immeasureable number of milk modifications, varying in the percentages of their elements and in the combination of these percentages. Although Rotch insisted that there should be only one system of infant feeding—the percentage system—diversity and not uniformity was his fundamental rule.[54]

As was evident in his numerous publications on the subject, Rotch believed that infant feeding should be medically directed. Prior to the methods of intervention recommended by Rotch and his colleagues, most artificially fed infants were given proprietary preparations or cow's milk, sometimes under the direction of a physician,[55] but judging by mortality statistics, presumably without a great deal of success.

However, it appears that if physicians were to overcome their uncertainty related to infant feeding by developing their knowledge, then medical control was for them essential. By developing a "more exact system" of infant feeding, Rotch intended to "rescue this important branch of paediatrics [infant feeding] from the pretensions of proprietary foods and the hands of ignorant nurses."[56] However, the percentage system alone could not accomplish this. Thus, based on the belief "that actual modification of milk in many instances could not but be improperly done by mothers, and that what was needed in milk modification was a perfect technique,"[57] Rotch established milk laboratories where prescriptions for exact percentages of the elements of milk, minutely varied to suit each infant's digestive powers, could be filled. Under strict medical supervision, laboratory milk clerks were to fill physicians' individual and precise prescriptions for modified milk formulas.[58] As Rotch said, "these milk laboratories [were] intended to take the same position toward the modification of milk that apothecary shops [had] to drugs."[59]

The first milk laboratory was established in Boston in 1891 with the assistance of two non-medical men, G. E. Gordon, a farmer from Milwaukee, who provided the necessary technical expertise, and a Boston businessman, George A. Walker, who provided the required funding. The milk laboratory rapidly gained popularity and by 1907 laboratories had been established in twenty cities in the United States, as well as in some Canadian cities, and in London, England. According to Rotch, purity of the milk supplied by the laboratory was of foremost importance. Additionally, the percentage modifications were to be prescribed by physicians only, and thus dispensed only on a physician's prescription. Although initially these prescriptions dealt exclusively with percentages of fat, sugar and protein, Rotch later developed methods of prescribing mixtures which utilized some of the ingredients used in patent baby foods.[60] Undoubtedly, therefore, Rotch had not only taken the preparation of milk for infant feeding from the hands of a good many mothers and nurses, but, by prescribing what he considered of importance in patent foods, he attempted to curb the influence of the infant food manufacturers. Thus it appeared that physicians were not about to relinquish any detail of infant feeding to non-medical persons. The availability of commercially manufactured infants' foods—some of which, when used in conjunction with clean milk, provided an adequate source of nutrition[61]—complete with directions for use, perhaps represented an even greater threat to the medical profession[62] than did nurses' involvement in the care and feeding of infants.

Unquestionably, the percentage system of infant feeding was widely employed in North America. However, because percentage calculations and formulae preparations were so cumbersome, many physicians rejected percentage feeding in favour of simpler measures. Additionally, Rotch's belief that minute variations in a single food element made the difference between whether or not it was digested was not accepted by all physicians involved in the care of infants. That physicians wanted simplicity rather than complexity in infant feeding was expressed, as follows, in the writing of one paediatrician:

> The average physician...either comes to look on infant feeding as in the highest degree a difficult problem, and babies' digestions habitually delicate, requiring complicated formulae and frequent minute changes in percentages, or he discards all theories in disgust and leaves the feeding of the baby to the mother or nurse, or even resorts to the wares and printed directions of the advertising

food manufacturers.[63]

Although this physician believed that infant feeding should be medically directed, unlike Rotch, he felt that this could be accomplished, without the complex knowledge of exact percentages, by giving simple directions for the preparation of milk.[64] As was much later noted with regard to Rotch's insistence on minute and complex variations in infant feeding, "everyone appreciates...of course, that such small changes [were] entirely useless and irrational."[65]

That Rotch greatly influenced medical control of infant feeding can hardly be doubted. However, it is interesting to note, even though he agreed that an absolutely clean and bacteriologically harmless milk supply was essential to safe infant feeding, and that "the modification of impure milk must necessarily be disastrous to the infant,"[66] modified milk dispensed from milk laboratories on a doctor's prescription was, in view of the expense involved, available to a very limited proportion of the population.[67] Furthermore, if Rotch sincerely believed the preventive medicine of infancy to be "pre-eminently the intelligent management of the nutriment [which enabled] young human beings to breathe and grow and live,"[68] his attempts to solve the infant feeding problem with the introduction of the percentage system and the milk laboratory, by the nature of the restrictions these imposed, appear to have contradicted his basic philosophy. Undoubtedly Rotch's innovations helped some infants who were artificially fed, but it appears that many were unaffected by percentage feeding and the milk laboratory, and thus suffered continued exposure to the hazards of impure milk. While the work of Rotch ultimately placed infant feeding in the hands of paediatricians and thus served an important purpose in the development of paediatrics as a speciality,[69] it is difficult to determine from the evidence examined whether this outcome was Rotch's principal goal or whether it was a natural consequence of his involvement in the infant feeding problem. Nonetheless, whatever Rotch's motives, he did appear determined to prevent non-medical workers—nurses, for example—from becoming involved, independent of medical control, in the infant feeding problem.

The Certified Milk Movement

So far as commercial milk production in the nineteenth century was concerned, everyone involved was "a law unto himself."[70] Objectionable conditions could be found throughout most dairies. Everything was dirty—the premises as a whole, the barn, the litter, the cows, the milkers, the utensils, and the water supply. Where carelessness in handling was the rule, the product was hardly expected to be clean and wholesome.[71] Among the most deplorable conditions were those which existed in New York City, where the milk supply in the mid-nineteenth century was described as follows:

> More than half of the milk used in the city came from cows fed only on distiller's mash. At Nineth Avenue and 18th Street, adjoining a distillery, were sheds containing 2000 cows. City tramps were the milkers, being paid for their labour by night shelter in the stables. The cows were diseased and the milk filthy.[72]

The milk producer had only a commercial interest in his work, and the consumer had little knowledge of the health hazards intrinsic to the product offered.

In 1888, through the necessity growing out of a personal need to provide clean milk for the feeding of infants and young children, Henry L. Coit, a young New Jersey physician, later to become a well known paediatrician, began a campaign to improve the local milk supply. Having reached the conclusion that clean milk was one of the "most urgent fundamental questions" requiring public and professional consideration, Coit, in 1889, requested an investigation be conducted by the Medical Society of New Jersey.[73] This led, three years later, to the formation of the Essex County Medical Milk Commission,

> a commission of medical men which, by voluntary supervision and control of methods, paid expert inspection of dairy work and final certification of the product, undertook to influence a supply of milk produced under regulations imposed by themselves which should fulfill the most exacting requirements of the physician.[74]

These regulations imposed by the Commission involved regular chemical and bacteriological examination of milk and frequent inspection of cows by competent veterinarians. The three general standards of quality for the milk were: that it be free from large numbers of micro-organisms, and entirely free from the pathogenic variety; that it be resistant to early fermentative change; and that it have a constant nutritive value, a known chemical composition, and uniformity in the percentages of fats, proteins and carbohydrates. The reports compiled by the chemist, bacteriologist and veterinarian for the Medical Milk Commission provided the basis upon which a certificate of approval was issued to the dairyman, authorizing him to use the term "Certified",[75] and allowing him to sell a much improved product at a much increased price. Certified milk was intended for clinical purposes and therefore, if the demand at any time exceeded the supply, those persons in receipt of a physician's order were to be given preference as purchasers.[76]

Coit's system of medical control of the milk supply was duplicated elsewhere in the United States. In 1896 the second medical milk commission was formed in New York City, and a third commission was established the following year in Philadelphia.[77] The formation of medical milk commissions continued throughout the States and, in 1907, members of the twelve commissions in existence at that time formed a national organization known as the American Association of Medical Milk Commissions. The purpose of this organization was to bring into one compact association the medical milk commissions of the United States so as to facilitate the exchange of ideas and the adoption of uniform methods and standards of production, so that a supply of clean milk be made available to the general population, infants, children and adults alike, and to encourage the establishment of medical milk commissions in other cities. The following year the milk producers formed a national organization, the Certified Milk Producers' Association of America, and between the two associations "cordial cooperation" was said to have been fostered.[78]

According to an article published in 1912, following twenty-four years of effort, Coit believed that, since the public had no adequate knowledge of the subject, milk fit to use for infants and for the sick would only be obtained through the efforts of physicians. Furthermore, he felt it was "hopeless to expect to bring milk up to a grade of clinical efficiency by stimulating officers of the law or milk concerns or by demands through the press."[79] To him, medical control of the milk supply was the answer, this he made clear by stating that

> milk of a suitable quality for successful substitute infant feeding will never be obtained until physicians generally, and paediatricians in particular,

> realize that they must expend on it more mental energy than is required for the solution of any other problem.[80]

However, as shall be noted later in this chapter, philanthropic interest, in the absence of medical control, resulted in the widespread distribution of suitable milk for infant feeding.

Although most members of the American Paediatric Society agreed with Coit that pure milk in its raw state was the best substitute food for infants, they recognized that it was available on a very limited basis and therefore was not alone going to solve the problem of high infant mortality associated with artificial infant feeding.[81] By the end of the first decade of the twentieth century, for example, in Boston, New York, Philadelphia, and other metropolitan centres of the United States, certified milk comprised less than one per cent of the total milk supply. Many large cities, such as Washington, D.C. had no certified milk. The price of certified milk ranged from twelve to twenty cents a quart, the average price being sixteen cents,[82] making it a prohibitive expense for the great majority of families. As a prominent New York City public health official, Charles E. North, pointed out, the certified milk business had been founded on the "patronage of the well to do," and the associated high price prevented most people from buying it because it was considered a "luxury."[83]

Obviously, the belief that physician control was necessary to improve the quality of the milk supply, it did not guarantee a much needed supply of clean milk. On the one hand Coit recognized the necessity of using uncontaminated milk of uniform nutritive value for the feeding of infants, while on the other, he developed a system to improve the milk supply which was influential among only the class of people able to afford the added expense of certified milk, the very class of people among whom feeding related infant mortality was not the problem that it was among the poorer classes. This latter class of people—those without the resources necessary to procure clean milk for infant feeding—was virtually unaffected by Coit's work. As with Rotch and his contributions to the solution of the infant feeding problem, Coit's efforts were of value to only a minute proportion of the population. Undoubtedly, Coit's work was valuable in raising both public and professional awareness of the undesirable state of the milk supply and therefore contributed significantly to the betterment of public health, but it did not positively influence, to any great degree, the problem of using unclean milk for infant feeding. However as with the analysis of Rotch's work, it is difficult to determine whether Coit, in aiming for medical control of the milk supply, was motivated primarily by a need to elevate the status of paediatrics or by a desire to solve the infant feeding problem.

Pasteurization and Sterilization

Although the certified milk movement led to the development by 1912 of more than sixty medical milk commissions with a membership of 500 in the United States and Canada,[84] a trend toward heat treated milk, particularly of the pasteurized variety, presented notable opposition to the proponents of certified milk. Since milk was recognized as

> a substance in which most germs multiplied rapidly under conditions favourable for their growth, so that, if it became contaminated in any way by germs which caused disease, it could be a most dangerous food.[85]

Milk from a diseased cow could transmit tuberculosis, or, germs could be introduced by the milkers or other handlers of the milk, spreading diseases such as typhoid fever, scarlet fever, diptheria, and, particularly in infants, diarrheoa.[86] As was indicated in the results of a clinical and bacteriological study of pure and impure milk used in infant feeding in tenement houses and institutions of New York City, fairly poor raw milk when given in hot weather caused a much larger percentage of illness in infants than the same milk given after pasteurization.[87] Consequently, for those physicians who considered raw milk an unsafe infant food, heat treatment in the form of pasteurization or sterilization provided a means of rendering milk bacteriologically suitable for infant feeding.

The term pasteurization meant simply the heating of milk to a temperature below that of boiling (usually between 140°F and 158°F) for a short period of time, followed by rapid cooling.[88] It was a term often used synonymously, by members of the medical profession, with that of sterilization, although the latter term meant exposing milk to a temperature of above boiling point for a considerable length of time. In contrast to this, pasteurization did not usually render the milk absolutely sterile although it did temporarily retard the fermentative changes which took place in the presence of certain forms of bacteria.[89]

Of course, those favouring the use of pure raw milk saw no need whatsoever for any form of heat treatment. To them, pure milk was better than purified milk. Pasteurization was "an expedient and not an ideal," and heating served only to improve bacteria-laden and infected milk.[90] Additionally, it was argued that pasteurization promoted carelessness in the production and handling of milk and discouraged efforts to produce clean milk. Still, even though G. F. Freeman, a New York paediatrician noted for his contributions to the clean milk question, agreed that fresh uncooked milk was the "ideal and rational" form for infant feeding, at the close of the nineteenth century he said,

> the practical impossibility of obtaining cow's milk clean has rendered some form of sterilization necessary. It does not seem fair to put into an infant's stomach a food containing thousands of bacteria in each drop, these bacteria being of unknown quality and very possibly of dangerous and pathogenic nature.[91]

Thus, by the second decade of the twentieth century many physicians—particularly paediatricians—advocated some form of pasteurization or sterilization. However, the chemical changes in milk rendered by these processes had long been the cause of concern. According to several authorities, the higher the temperature used the greater the degree of chemical change. It was initially thought that milk cooked to the boiling point was changed to such an extent as to make it difficult for infants to digest, and that if used on a long term basis, would almost certainly have led to the development of scurvy or rickets or a combination of both diseases. Pasteurized milk, on the other hand, having been exposed to less heat, underwent fewer chemical changes and was therefore less likely to cause nutritional disturbances of the sort associated with the use of sterilized or boiled milk.[92] Thus, the argument appeared to be in favour of pasteurization. Nonetheless, this process was more complex and required more care and special apparatus than that of boiling. Moreover, if it was not done properly, pasteurization was thought to be little better than useless. Heating milk to boiling point, on the other hand, was simpler and could be done using a variety of inexpensive utensils. Among the poor, this form of safeguard was considered the most efficient because people of the poorer classes could neither afford the equipment necessary for pasteurization nor the time involved in the process.[93] Had commercially pasteurized milk been available on an extensive basis, there would no doubt have been less need for home processing. However, at the turn of the century, compulsory pasteurization of market milk was unheard of, and, as the century progressed, was only slowly introduced, initially in large urban centres, then throughout smaller cities and towns. The impetus for compulsory pasteurization was related to both economic and health care needs. That is, from an economic point of view, pasteurization provided the milk producer with a means whereby milk could be prevented from spoiling, thus making it more readily marketable, while from the point of view of pulic health officials, the process rendered milk disease-free.[94]

Of interest with regard to the issue of heated milk, is that one of America's most prominent early paediatricians, Abraham Jacobi, had long practiced and taught the wisdom of boiling milk. As he said in 1889 in relation to the bacterial content of milk, "I have always advised to boil the milk destined for the use of a baby as soon as obtained."[95] Jacobi recommended the use of a domestic sterilization apparatus, the first of its kind, devised by the German chemist, Soxhlet, and introduced in the United States in the late 1880s.[96] Other forms of milk processing equipment were soon to follow. For instance, in 1892, Freeman developed an apparatus for home use that "sterilized" milk at a low temperature (pasteurization). After some experimentation, it was found that the apparatus, when used as intended, rendered ordinary milk amost sterile after exposure to a temperature of 70°C (158°F).[97] The process and apparatus, however, required time and money, so would have had limited domestic application among the poorer classes. Of course, Freeman's rationale for use of a lower temperature was that boiled milk was chemically and nutritionally less suitable for infant feeding.

Although, as already mentioned, Jacobi had long since recommended the use of boiled milk, it was not until well into the twentieth century that the myths, which for so many years surrounded the boiling of milk, were to some estent dispelled. For example, the long held belief that protein indigestibility was associated with the use of boiled milk was shown by Joseph Brennemann to be ill founded. In the second decade of the present century, following many years of laboratory experimentation and clinical observation, he demonstrated that the protein of boiled milk was considerably easier to digest than that of either raw or pasteurized milk. Further to this, since heat was thought to destroy the antiscorbutic property of milk, Brennemann recommended, as did by this time many other physicians who favoured the use of boiled milk, the addition of orange juice to the infant's diet.[98]

Whether it was a question of using sterilized or pasteurized milk in order to overcome the problem of bacterial contamination, the methods developed by members of the medical profession of doing so were more often than not designed such that they could not possibly reach the great number of homes where assistance with the problem of dirty milk was most needed. Boiled milk was certainly the simplest solution to the problem of contamination, however, the associated chemical and nutritional inadequacies were not overcome until well into the present century. Thus, when "pure" raw milk was not available, which was, as has been shown in the foregoing, very often the case, physicians advocated methods of home pasteurization that were expensive and time consuming and consequently advantageous to relatively few people.

Home Milk Modification

In addition to the problems associated with pasteurization and sterilization, was the problem of home milk modification. Since most physicians agreed that cow's milk did require modification if used for infant feeding, and since the majority of mothers could not afford the services of a milk laboratory, it was necessary to develop methods of home modification. There were various pieces of equipment developed by physicians to fulfill this need, the glass siphon being, in design, the simplest of these. The purpose of the siphon—cheaply and simply made by one Canadian physician for each mother seen by him[99]—was to separate the cream from bottled milk. The cream was then pasteurized and modified with water, sugar and sometimes part of the milk left after the cream had been removed.

An alternate device to the siphon was developed by a New York paediatrician, Henry D. Chapin, who believed that siphoning was an inaccurate and difficult method of separating milk from cream for the purpose of preparing infant formulae. Chapin introduced a one ounce "dipper" fashioned to fit into any standard quart milk bottle, which he claimed was more accurate than a siphon because, with a dipper, an exact amount of cream could be removed. Thus, depending on the percentage of fat and protein in the cream, a reasonably precisely modified formula could be prepared.[100]

An additional apparatus for home modification, which was probably easier to use than either the siphon or the dipper, consisted of a glass vessel with a pouring lip, shaped like a graduate measure, capable of holding sixteen ounces of fluid. The outer surface of the vessel was divided by vertical lines into seven panels; one panel showed the ordinary ounce graduation; the six others showed six different formulae, arranged so as to be suitable for the entire first year's feeding. According to the age and size of the child, the vessel was to be filled with a combination of milk sugar, water, limewater, cream and milk. Full directions, including a schedule for the twenty-four hours' feeding at the various periods of the child's growth, were provided with the apparatus.[101] Thus, unlike other methods of home modification, less physician supervision was required.

Regardless of the recommended method of home modification, at the basis of the formula was a cream and water or a cream-milk-water mixture to which an appropriate amount of sugar was added. Although the majority of physicians favoured the use of devices specifically designed for the purpose of home modification, when economic conditions—in the case of the working class family,[102] for example—did not permit the purchase of such items, those utensils already available in the home were used as a compromise. However, whatever the family's economic circumstances, the use of pure milk and clean utensils were emphasized. The general conditions for home modification, then, were: that the cow's milk formula used closely resembled human milk; that the milk used was uncontaminated with bacteria; and that clean utensils were used to ensure that the formula remained bacteria free until consumed by the infant. Needless to say, according to the majority of publications related to home milk modification, physicians saw it as their duty to ensure that these conditions were met.[103] As one physician wrote in 1904:

> After the child is well started on his food, calls are made every two weeks and then once a month, the doctor dropping in at unexpected times, inspecting bottles, etc., so that the mother is kept up to mark and the formula is changed as the child's needs require.[104]

Thus, although not restricted to the control of laboratory preparations, home milk modification was not to be entirely trusted to the hands of mothers, nor for that matter, to those of nurses. It appears then that, if according to physicians the infant feeding problem was to be overcome, all related aspects were to be medically directed.

Maternal Nursing and Wet Nursing

In addition to artificial feeding, breast feeding was also to be medically directed. No doubt one of the simplest methods of guarding against the dangers associated with artificial feeding was to have more women breast feed their infants. Thus, another commonly held medical belief—of those physicians involved in the development of artificial feeding as well[105]—was that breast milk was the best available infant food. Moreover, some physicians believed that every baby had a right to be breast fed and it was every mother's obligation to fulfill this right. Women who did not nurse their infants were accused by one physician at the turn of the century of committing a "physiological crime." He went on to state that,

> among the many retrograde tendencies of advancing civilization there is none more dangerous than this tendency to shirk the various obligations of mother-

> hood; and during later years there has developed the pernicious custom of cheating helpless babies out of birthrights, by giving them through false nipples, ingenious imitations of their rightful food.[106]

Another physician at a later date wrote that unless she was convinced that the act of nursing would do either herself or her baby irremedial harm, "no mother worthy of the name should ask to be relieved from nursing her baby."[107] Every mother was to be taught that she could and must nurse her infant, because "the mother who failed to make every reasonable effort was derelict...robbing her child of its best opportunity for maximum growth and development."[108] Yet another physician wrote in the late nineteenth century that those "selfish creatures—who intentionally and wilfully deny the infant its birthright could hardly be considered women, let alone mothers."[109]

Nonetheless, there were exceptions to the physician's insistence that every mother breast feed her infant. For example, there was general medical agreement that a chronically ill woman, particularly one suffering from tuberculosis, should not nurse her baby. Nervous disturbances, pathological conditions of the breast and acute infectious diseases were other contraindications.[110] On the whole, the concensus of medical opinion indicated that breast feeding should not be continued or undertaken when the extra strain of nursing reduced a mother's chance of recovery from illness or when her health failed, although not necessarily as the result of any specific disease. In addition, failure of an infant to thrive on breast milk was an acceptable reason to discontinue nursing.[111]

However, apart from the conditions under which women were not expected to breast feed, the conditions thought by physicians as being ideal for nursing mothers, were, for the majority of women, quite unrealistic. For instance, diet, exercise and sleep were to be well regulated. That is, an abundance of nourishing food, open-air exercise and exposure to sunlight, and early hours were considered by physicians as necessary requisites to successful breast feeding. Moreover, worry and excitement were to be avoided so as to permit the nursing mother to be of a consistently happy temperament.[112] While these expectations may have been possible for women from the upper classes and perhaps some middle class women, for the majority of working class women they were out of the question. The amount of nourishing food available to the average working class family was minimal, and when available, father and children were fed first, while mother often went without. Certainly, working class women were given to exercise, not, however, the leisurely kind recommended by the middle class physician, but rather that involved in long hours of domestic work or, in some instances, factory labour. Nevertheless, many women of lower socio-economic means did successfully nurse their infants, regardless of the inadequacies of an impoverished standard of living.[113]

Unquestionably, the general belief within the medical profession was that the physician was the best person to supervise the breast feeding of the infants. Since physicians considered that mothers "rarely [knew] the conditions requisite for the satisfactory nursing of a child,"[114] they were compelled to adopt their "rightful role" as the mother's educator in breast feeding.[115] Attention to the most minor details of good nursing were not beneath the physician's notice, nor were these to be relegated entirely to the nurse.[116] Whether the physician's need to control the breast feeding of infants was related to his uncertainty regarding the broad area of infant nutrition or whether such control was used as a mechanism leading to the general control of infant and child health care, is unclear. Nonetheless, whatever the case, according to medical opinion, mothers did not know how to breast feed successfully, nurses were ill equipped to teach them, therefore, physicians had no other choice but to intervene. However, it is interesting to note that, prior to medical intervention, many women appear to have breast fed successfully,[117] and, as shall be seen in the following chapter, nurses demonstrated a high degree of competence with regard to their involvement in infant-feeding.

Undoubtedly, high death rates among artificially fed infants, and the suspicion that the capacity of women to breast feed had declined, caused concern within the medical profession. As Holt wrote in his well known late nineteenth century paediatric text:

> While among the poor the capacity for maternal nursing seems to be diminishing year by year, among the better classes it has come to be the exception and not the rule. In my private practice not one third of the mothers have been able, even though willing, to nurse their infants.[118]

However, whether or not the declining incidence of breast feeding was associated with a diminished capacity of women to nurse was never demonstrated. Although there were various studies conducted by physicians indicating a decline in the number of women who breast fed, the study results gave little evidence of why fewer women were breast feeding, but rarely failed to mention the need, as identified by the physician, for medical intervention. To illustrate, in 1913, Henry Koplik, a well known New York paediatrician, reported that of 1,007 infants seen in private practice only 40 per cent were breast fed four months or longer. It was Koplik's opinion that physicians were not diligent enough in their efforts to encourage breast feeding, too often finding it easier to recommend substitute feeding. To remedy this situation he urged the "higher education of the physician in the hygiene and diseases of infancy." This, Koplik felt, would prevent the hygienic and prophylactic aspects of child care from passing into the hands of the boards of health, and thus, "so-called municipal control."[119]

In a later study of infants seen in private practice it was found that in 1,000 cases (excluding those from the poorer classes), 54.3 per cent were nursed four months or longer. Although these results were slightly more favourable than Koplik's findings, it was agreed that in attempting to increase the number of nursing mothers, physicians were to take the leading role. Moreover, in difficult cases for establishing breast feeding, physicians were to "dominate the situation."[120] The results of other studies[121] were on the whole similar to those cited above in that they indicated that fewer women were breast feeding than, according to physicians, should have been the case. Additionally, it was found that, of the cases studied, more working class women breast fed than did women from other classes of society.[122] Without the resources necessary to procure suitable cow's milk, working class women were often compelled to breast feed. Nevertheless, because the living conditions of many working class women were contrary to good health, breast feeding frequently served as an additional strain and therefore did not always guarantee an adequate source of nutrition for their infants. Contrary to this often desperate situation, middle class women, for example, who chose not to breast feed, were usually in a position to consult a physician and get a prescription for laboratory milk, or buy certified milk and modify it at home for their infants. These alternatives were simply beyond the means of working class women.[123] However, the most obvious point in all of the studies cited was the unanimous agreement that proliferation of information concerning the importance of breast feeding among the various classes of society be directed by members of the medical profession. As J. P. Sedgwick, a paediatrician best known for his advocacy of breast feeding, said:

> Even the students of sociology and social workers, editors, clergy, philanthropists and nurses, who are doing such valiant work for the prevention of infant mortality, as well as the midwives, must draw their information upon this technical subject [breast feeding], from the medical profession.... The newspapers can, and some now do, through 'Babies Friend' departments, give great aid in distributing knowledge about breast feeding. Such departments may, however, do definite harm if not carried on under the direction, or with the advice of competent pediatrists.[124]

In addition to the research data gathered relating to the incidence of breast feeding, physicians conducted studies demonstrating that mortality and morbidity rates were higher among bottle fed babies than among those who were breast fed. For instance, a Boston Health Department statistician reported the results of a questionnaire survey conducted to determine the mortality of breast fed and bottle fed infants. The results indicated that 74 per cent of infant deaths above the age of two weeks were among bottle fed babies. During the summer months when gastro-intestinal diseases were a grave problem, the number of deaths among breast fed infants was only slightly higher, while among bottle fed infants the mortality trebled. Additionally, it was found that there were more deaths from communicable and other childhood diseases among bottle fed infants than among those fed at the breast.[125]

In another study, members of the American Paediatric Society were surveyed as to their experience regarding the susceptibility of breast and bottle fed infants to contagious and infectious diseases and to general infections. The clinical experience of the respondents indicated that breast fed infants were less susceptible to infections, and if they did become ill they recovered more rapidly and with less injury than bottle fed infants.[126] That mortality and morbidity rates were lower among breast fed infants, eventually led to the conclusion that breast milk contained certain protective substances or antibodies that conferred immunity upon the infant.[127] Thus, the physician was provided with scientific evidence that breast feeding was indeed superior to artificial infant feeding, and it appears that this knowledge, together with statistical evidence that fewer women were nursing and too many infants denied the breast were dying, led physicians to believe that medical intervention was essential. It seems reasonable to conclude that if more women had been encouraged to breast feed during the difficult period of safe artificial feeding development, fewer babies would have died.

Since maternal nursing was to be medically directed, it is not surprising that physicians thought themselves best suited to establish guidelines for wet nursing as well. So far as the value of wet nursing as an alternate means of infant feeding was concerned, opinions within the medical profession differed. While some physicians "when confronted with a hungry infant and a failing maternal breast, did not hesitate long in securing a wet nurse,"[128] others viewed her as a last resort. Although the earlier belief that moral, mental and physical characteristics were transmitted through the medium of the wet nurse's milk had long since been dispelled, the great practical objections to wet nursing continued to be related to the wet nurse herself rather than to her milk. That is, regardless of a healthy milk supply, if she did not have the characteristics deemed desirable by physicians, she was unfit to serve as a wet nurse. An additional criticism of wet nursing was that the mortality of wet nurses' infants, abandoned by their mothers and bottle fed, was excessively high. However, even though physicians disagreed as to the wet nurse's practical value, there was obvious agreement regarding requisite qualifications if one was to be employed. According to medical opinion, the wet nurse was to be a healthy, morally upstanding woman of a consistently mild temperament, not older than thirty years, and free from chronic diseases, such as syphilis and tuberculosis.[129] Furthermore, physicians saw it as their duty to decide whether or not prospective wet nurses met these requirements. Many physicians believed that there were few women suitably qualified to be employed as wet nurses, and as one physician wrote in 1898:

> The difficulties in the way of securing fit wet nurses are so great, the risks and dangers from securing unfit ones are so many, that as a rule it is better to pass over this possibility altogether when considering the problem of infant feeding.[130]

Interestingly, by the end of the nineteenth century wet nursing had become very much less popular in the United States than had been the case during the earlier part of the century, even though cities such as Boston and New York still had directories for wet nurses.[131] A similar trend was noted in Canada, where as early as 1894 the wet nurse was considered "a rarity".[132] In an attempt to explain the declining popularity of wet nursing, one Philadelphia physician in the early 1900s suggested that "respectable" working class mothers who had one assumed positions as wet nurses with families of the wealthier class, had grown so independent as to no longer desire such employment.[133] Additionally, it is probable that by the turn of the century the improvements in bottle feeding—notably, the availability of pure milk for infant feeding—encouraged more women to resort to artificial feeding.

Undoubtedly, then, whether maternal nursing or wet nursing was undertaken, physicians of the day believed that their newly acquired "scientific" knowledge and the incompetence and ignorance of mothers and nurses, whether real or assumed, called for medical management of breast feeding.

Proprietary Infant Foods

If physicians were to become the infant feeding experts they thought they should become, they needed not only to oversee mothers and nurses, but to dominate the infant food manufacturers as well. Although not all proprietary or patented foods were considered worthless, those thought by physicians to serve a useful purpose were to be used only under medical direction. Holt, for example, recommended, for temporary use in pathological conditions, some commercially manufactured products. He was adamant, however, that these were "to be prescribed like drugs," necessitating "a very definite knowledge" of exactly what the prepared foods did and did not contain.[134] Similarly, Rotch argued that since

> not only is there no practical object in making use of the patent foods when we [physicians] can perfectly well prescribe whatever is of importance in these foods, but by understanding exactly what food stuffs in a particular preparation are...we can, by intelligent prescriptions, aid in the development of a better system of infant feeding.[135]

In addition, another well known paediatrician of the day, Joseph Brennemann, agreed that some commercially prepared infant foods were therapeutically valuable if used under the guidance of a physician, but never according to the directions on the food container. However, Brennemann wrote that, on the whole, "baby foods" were unnecessary and expensive and that they offered a system of feeding that eliminated scientific individualization. Moreover, he continued, "they leave the accurate diagnosis and the indications for individual treatment of one of the most complex and fateful problems in medicine [infant feeding] to the mother and the directions on a tin can or glass bottle."[136] Nonetheless, while the indiscriminate use by the laity of propriety or patented infant foods may have led to the development of serious nutritional disorders, this was in all likelihood less often the case than physicians had the public believe.[137] It appears, then, that the intent of medical intervention was to gain total control of infant feeding and part of that process was to dominate the manufacture and distribution of commercial infant food products. However, whether the goal of physicians in gaining control of infant feeding was to establish the medical speciality, paediatrics, and thus place child health care in the hands of the medical profession remains unclear.

The infant food industry began in the United States in the late 1860s with the introduction of Liebig's food, a mixture of milk, wheat flour, malt flour and bicarbonate of potash developed and market-ed by the German chemist, Justus van Liebig. The home preparation of Liebig's food was complex and time consuming and soon lost popularity with the introduction of numerous other more convenient infant foods.[138] The most commonly used infant foods were classified by physicians, usually under three headings; the milk foods, the Liebig or malted foods, and the farinaceous foods. The milk foods included such preparations as Nestlé's, Anglo-Swiss, American-Swiss and Gerber's, all of which consisted of cereals specially prepared in combination with milk. In the second category, Liebig's, Horlick's, Mellin's and Hawley's foods were included. These were derived from malted wheat and barley flour, and were composed of a mixture of dextrines, dextrose, and maltose with a small amount of cane sugar added. The group of farinaceous foods consisted of Ridge's food, Hubbell's Wheat Flour, Imperial Granum, Robinson's Patent Barley, and a number of other less well known preparations. These foods consisted mainly of unchanged starch which formed from seventy to eighty per cent of their solid constituents.[139] The majority of proprietary infant foods was subjected to extensive analysis and compared with the composition of human and cow's milk. These analyses, as reported in the medical literature, indicated that, on the whole, the proprietary infant foods contained an excess of carbohydrates, insufficient fat, and vegetable rather than animal protein. Medical opinion indicated therefore, that they should be used on a short term basis and then only under the direction of a physician.[140]

An additional commercially prepared product widely used in the feeding of infants was condensed milk.[141] Unlike the milk foods and malted foods mentioned above, condensed milk did not contain a starch additive. Since in the process of condensing, the milk was exposed to a sufficient degree of heat to destroy any germs it contained, it was considered, so far as purity was concerned, a safe preparation to use for the purpose of infant feeding. It was also inexpensive, readily available, and easily prepared for bottle feeding, even in the case of the working class family. However, physicians objected to the use of condensed milk because it contained a high percentage of sugar and was deficient in amounts of both fat and protein and, therefore, if used on a long term basis, sometimes led to the development of nutrition related diseases such as anaemia, scurvy, and rickets. Conversely, the greatest advantage of condensed milk recognized by physicians, was its use when access to a supply of clean cow's milk was impossible.[142] That the product had both advantages and disadvantages was clearly expressed in the writing of one New York paediatrician who said:

> Through the ignorant use of condensed milk as an infant food, many lives are lost yearly in our large cities, while, on the other hand, to its intelligent use may be attributed the fact that many lives are saved.[143]

Even though the use of condensed milk did not necessitate medical advice, physicians saw it as their duty to attempt to supervise its use, thus guarding against the so called "gross feeding errors" likely to be made by "well-meaning" mothers and nurses.[144] In other words, whether condensed milk or some other form of prepared food was being used, if physicians were to dominate the field of infant feeding, be it in the interests of the infant's health and welfare or the emerging medical speciality, paediatrics, the influence of the infant food manufacturers had to be thwarted.

Infant Milk Depots

However, regardless of the manner in which physicians attempted to control infant feeding, whether it be in relation to the use of proprietary infant foods or, as previously described, in relation to Rotch's percentage system and laboratory feeding, Coit's certified milk, methods of home modification, pasteurization or sterilization, or breast feeding, the form of remediation which appears to have had the most significant impact on the infant feeding problem was the establishment of infant milk depots, or stations, from which the poorer classes were provided with clean milk for infant feeding. As a New York physician wrote in 1914, "that milk stations have a tremendous influence in reducing infant mortality is apparent everywhere they exist."[145]

The first infant milk depot was started by Dr. Henry Koplik at the Eastern Dispensary in New York City in 1889.[146] Here, approximately 200 bottles of milk were dispensed daily at a cost of eight cents per six bottles.[147] However, even though the dispensary provided clean bottled milk for infant feeding, it was only to be distributed on a physician's order; therefore the milk was not available to those mothers unwilling or economically unable to seek medical advice regarding the feeding of their infants. For Koplik, medical control of infant feeding was of great importance, and, on this point, he later said "[no] infant either in health or disease [should] obtain food at any station, except upon a physician's order."[148] Fortunately, this restriction did not apply to the establishment of New York's second milk depot, opened in 1893 by the philanthropist, Nathan Straus. Pasteurized milk of three different strengths (whole milk and two modified milk mixtures) was sold in six and eight ounce bottles at a cost of one to one and one half cents per bottle. During the summer of 1893, 34,000 bottles were sold and by 1896 this figure had increased to more than 600,000. In the first five seasons of the charity's existence more than 2,000,000 bottles of milk were distributed, as many as 7,000 being dispensed on a single day.[149]

During the years that followed Straus' initial charitable effort to help reduce infant mortality, additional milk depots—the majority of which were originally supported philanthropically—were established in other areas of the United States as well as in some Canadian cities. The milk depots were usually situated in crowded slum districts and were initially established to provide the poor with pure milk for infant feeding. However, by the mid 1890s other services provided by milk depots included those offered by nurses and physicians. Most depots operated during the summer months only, because it was during this season that infant mortality associated with diarrhoeal diseases was at its highest. The milk depots were usually run by trained nurses who were responsible

> under the proper supervision and guidance of a physician, to teach the mother the physiology of infancy, to demonstrate to them how to prepare the milk formulas at their respective homes with the available utensils, to inculcate in these mothers the necessity of cleanliness at home, and to impress upon them the importance of regular and frequent visits to the milk stations.[150]

It was not the intention of the milk depot workers to discourage breast feeding by distributing at a low cost, and in some cases free, safe milk for the purposes of infant feeding. On the contrary, breast feeding, if at all feasible, was encouraged by nurses and physicians associated with infant milk depots. Even so, some physicians believed that, when milk depots were initially established, the widespread distribution of pure milk unintentionally encouraged artificial feeding by giving mothers a false sense of security so far as bottle feeding was concerned.[151] Nevertheless, the majority of physicians did not deny the positive impact of infant milk depots, and instead directed their efforts toward intensifying medical influence in this very crucial component of infant welfare work. As Freeman said in 1912, the "ideal milk depot," in addition to being equipped to dispense suitable milk, was to provide a consultation room where a physician would "spend certain hours each day." Although the nurse was to spend "all her time on the work in the depot and the homes," she was not to do so without medical supervision.[152] Several years prior to Freeman's statement, another New York physician had said with regard to the respective roles of nurses and physicians in milk depot work, "the nurses should be responsible for the social statistics and the physicians responsible for the feeding statistics of the infants under them."[153] Nurses could act as milk depot "directresses," but under no circumstances were they to become decision makers so far as the health care of infants was concerned. Despite the medical profession's failure to solve the infant feeding problem, physicians still considered themselves authorities—and they were, so far as their developing body of knowledge related to infant feeding was concerned—in the field and were obviously not prepared to permit milk depot work and its associated success to continue without considerable medical input. Nurses could coordinate the operation of milk depots, but physicians were to make the decisions related to the care provided at these facilities.

Even though there was not an abundance of statistical evidence collected supporting the success of infant milk depots, there were some studies conducted indicating the association between the establishment of milk depots and a reduction in infant mortality. For example, in order to determine the extent to which the New York City Straus Milk Charity had favourably affected infant mortality, the number of deaths due to diarrhoeal diseases during July and August (the months during which most of the milk depot work was done) for the years 1890, 1891 and 1892 were compared with the figures for 1894, 1895 and 1896. During the former three year period there were 6,122 deaths from diarrhoeal diseases, while for the latter three year period there were 5,262. These figures indicated a saving of 860 lives from diarrhoeal diseases. This decrease in the number of deaths from diarrhoeal diseases was therefore thought to be attributed, to some degree at least, to the distribution of milk from the Straus Milk Depots.[154]

Similarly, to ascertain how the work of the Sterilized Milk Dispensary of Yonkers, New York (established in 1894) affected the mortality rates, deaths among children under five years for the months of June, July, August and September in the years from 1892 to 1896 were tabulated with the following results: the average number of deaths among children under five for the four years from 1892 to 1895, was 162; in 1896 the number was 135, a decrease of 37 deaths or 17 per cent, while the average number of deaths from digestive troubles was 91; in 1896 the number was 48, a decrease of 43 deaths or 47 per cent.[155] During the same period the mortality in three neighbouring towns of similar population, but without infant milk depots, demonstrated by 1896, almost without exception, an increase in the number of deaths among children under five years of age, particularly from diarrhoea.[156] The continuing positive influence of milk depot work in the district of Yonkers was demonstrated in later years by a consistent drop in deaths due to diarrhoeal diseases, particularly among children less than two years of age.[157]

In Manhattan and the Bronx, as shown in the following chart, during the period from 1910 to 1915 there was a considerable increase in the number of infant milk depots and a concomitant decrease in the number of infant deaths due to diarrhoeal diseases. Although the diarrhoeal death rate had been declining slowly for several decades prior to 1910, the decrease from 1910 to 1915 is far greater than during any previous five year period.

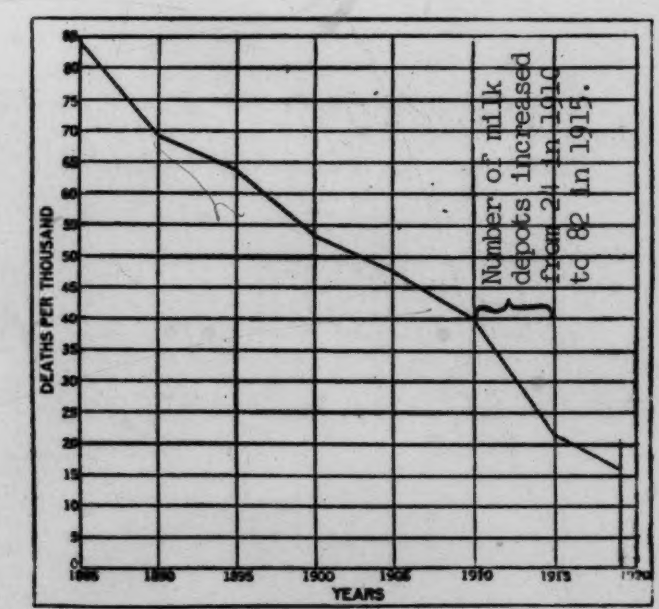

Figure 2. Decline in Infant Mortality Rates due to Diarroeal Diseases, Manhattan and the Bronx[158]

However, probably the most convincing evidence of the benefit of milk depot work in New York City can be seen in the results of Park and Holt's observations of tenement house babies. Of the summer observations made, fourteen of the seventy infants fed condensed milk died; fifteen of the seventy-nine infants fed store milk (the poorest grade of milk sold in New York City) died; and nine of the ninety-eight infants fed "good" bottled milk (produced under fairly sanitary conditions) died. In contrast to all of these, there were only four deaths among the 145 infants fed on milk obtained from an infant milk depot.[159]

In addition to the above, in Hamilton, Ontario, deaths for children under three years from gastro-intestinal diseases decreased from 57 per cent to 19 per cent between the years 1908 and 1914. This decrease was thought to be associated with the introduction of the Babies' Dispensary Guild, which opened in 1908, dispensing clean milk for infant feeding and offering advice to mothers regarding infant care.[160] It is interesting to note, however, that, on the whole, there were far fewer milk depots in Canadian cities than in the cities of the United States. For example, in 1914 there were ninety-one milk depots in New York City, while in Montreal, where overcrowding and poverty were said to be less of a problem, but where the infant mortality rate was three times that of New York City, there were only twenty-seven infant milk depots. In Toronto there were eleven milk depots and in Ottawa, four, and in both cities infant mortality rates were higher than in New York City.[161] Undoubtedly, there were other factors influencing the consistently high infant death rates in these Canadian cities; however, it is not unreasonable to suppose that had there been more infant milk depots established earlier in the century, the number of infant deaths may have been less.

Although the above statistics do not by any means prove that the establishment of infant milk depots caused a decrease in mortality rates, they suggest a strong association between the two. Had control of other variables influencing death rates been introduced, perhaps the evidence supporting the effect of milk depot work would have been more conclusive. Of course, apart from the distribution of pure milk, the instruction and advice given to mothers regarding infant hygiene, and the follow-up home care by the milk depot nurses, in all likelihood contributed to the reduction of death rates. However, since these additional services were not systematically introduced with the establishment of the early milk depots, and, following their introduction, were for some years offered on a limited basis only, the distribution of pure milk alone appears to have had a positive influence. Unfortunately, however, there was little research conducted to determine the relative value of the other services offered at milk depots, although as Freeman demonstrated in 1912, educating mothers in matters of infant hygiene, independent of the provision of pure milk, did have a positive influence on the death rate. But, when maternal education and the dispensing of pure milk were combined, as with milk depot work, the decrease in the number of infant deaths, particularly those due to diarrhoeal diseases, was very much greater.[162] In addition to the treatment of milk, other factors having an influence on declining death rates included improvements in housing conditions, refrigeration, and a broadening and strengthening of municipal sanitation standards in general, including a safe water supply.[163]

Summary

Undoubtedly, then, as can be gathered from the foregoing, physicians of the late nineteenth and early twentieth centuries saw it as their role to direct the feeding of infants. That is, direction for milk treatment and formula preparations, the management of breast feeding, the use of proprietary infant foods, and the operation of milk depots were to fall under medical jurisdiction. Physicians considered mothers and nurses to be less competent than themselves in matters of child care, and since alarmingly high infant mortality rates were thought to be associated with artificial feeding, medical intervention was deemed by physicians as essential. However, since physicians were aware that at the basis of the problem of artificial infant feeding was a contaminated milk supply, their methods of remediation on the whole fell far short of solving the problem. Rotch's percentage system of feeding and his milk laboratories were certainly innovative, but only a small proportion of the population was reached by these, and as was pointed out later in the twentieth century, his insistence on minute and complex variations in infant feeding were "entirely useless and irrational."[164] Moreover, as with Rotch's innovations, several other methods of remediation appeared destined never to reach the vast majority of homes where they were most needed. Coit's certified milk, for example, was a luxury item to be found in the homes of only the wealthiest classes, and methods of home modification and pasteurization were often either too expensive or too complex for working class families.

Ultimately, the method of intervention which appears to have had the greatest impact on the infant feeding problem was the establishment of milk depots and the consequent widespread distribution of clean milk at a cost affordable to the majority of the population. Nonetheless, with regard to the work of Rotch and others, the motivation for and the end result of their methods of intervention appear so closely related that neither one is distinguishable from the other. In other words, it seems impossible to determine whether the purpose of medical intervention was to gain exclusive medical control of child health care or whether the latter was a natural consequence of such intervention. However, regardless of the fact that the various methods of medical intervention placed infant feeding in the hands of physicians and ultimately led to medical control of child health care, the widespread distribution of clean milk, from infant milk depots, for example, appears to have had greater impact on the infant feeding problem than any method of medical intervention.

Notes to Chapter II

1 James Bordley and A. McGehee Harvey, Two Centuries of American Medicine, 1776-1976 (Philadelphia, London & Toronto: W. B. Saunders Company, 1976), pp. 9-19; H. E. MacDermot, One Hundred Years of Medicine in Canada, 1867-1967 (Toronto & Montreal: McClelland and Stewart Limited, 1967), pp. 110-117; William G. Rothstein, American Physicians in the Nineteenth Century: From Sects to Science (Baltimore & London: The Johns Hopkins University Press, 1972), pp. 85-97; and Richard Harrison Shryock, "The American Physician in 1846 and in 1946: A Study in Professional Contrasts," Journal of the American Medical Association 134 (May 1947): 417-424.

2 Bordley & McGehee, American Medicine, pp. 187-189.

3 MacDermot, Medicine in Canada, p. 167.

4 By the end of the nineteenth century there were many reputable American medical journals in publication. The number of similar Canadian journals was less. For details,see Bordley & Harvey, American Medicine, pp. 71-72; 379-382; and MacDermot, Medicine in Canada, pp. 156-166.

5 Rothstein, American Physicians, pp. 88-90.

6 Norman Walker, "The Medical Profession in the United States," Edinburgh Medical Journal 37 (1891): 240-241, as quoted in Rothstein, American Physicians, p. 289.

7 Rothstein, American Physicians, p. 290.

8 For further information related to the development of these associations,see Rothstein, American Physicians, pp. 114-121; and MacDermot, Medicine in Canada, pp. 53-56.

9 Rothstein, American Physicians, pp. 63-64.

10 The Flexner report, entitled "Medical Education in the United States and Canada," revealed the "shameless incompetence" of the great majority of medical schools and resulted in the agitation of reform which caused, by 1920, 76 medical schools to become obsolete either by ceasing to function or by merging with stronger institutions. For further information, see Bordley & Harvey, American Medicine, pp. 161-165.

11 Rothstein, American Physicians, pp. 206-209.

12 Thomas E. Cone, Jr., History of American Paediatrics (Boston: Little, Brown and Company, 1979), p. 70.

13 Robert R. M. Gifford, "The Founding of the American Paediatric Society," Clinical Paediatrics 8 (June 1969): 369-371.

14 Thomas Morgan Rotch, Paediatrics (Philadelphia: J. B. Lippincott Company, 1895), as quoted in Cone, American Paediatrics, p. 99.

15 Rotch, Paediatrics, as quoted in Cone, American Paediatrics, p. 99.

16 Cone, American Paediatrics, p. 151.

17 John Lovett Morse, "Recollections and Reflections on Forty-Five Years of Artificial Feeding," Journal of Paediatrics 7 (September 1935): 305. Until the formation of the Canadian Paediatric Society in 1922, Canadian physicians sought membership in the American Paediatric Society. For further information regarding the formation of the Canadian Paediatric Society, see J. Harry Ebbs, "The Canadian Paediatric Society: Its Early Years," Canadian Medical Association Journal 123 (December 1980): 1235-1237.

18 Kenneth D. Blackfan, "Past Presidents of the American Paediatric Society, 1888-1938," American Journal of Diseases of Children 56 (July 1938): 6-9.

19 Harold Kniest Faber and Rustin McIntosh, History of the American Paediatric Society, 1887-1965 (New York: McGraw-Hill Book Company, 1966), p. 6.

20 Blackfan, "Past Presidents of the American Paediatric Society," p. 9.

21 Faber & McIntosh, American Paediatric Society, p. 5.

22 Faber & McIntosh, American Paediatric Society, p. 5.

23 Lewis Webb Hill, "A Critical Discussion of Certain Phases in the Development of Modern Infant Feeding: Their Influence Upon Present Teaching," Boston Medical and Surgical Journal 182 (March 1920): 311.

24 From the early nineteenth century writing of William P. Dewees, as quoted in Cone, American Paediatrics, p. 69.

25 L. Emmett Holt, "Infant Mortality, Ancient and Modern: An Historical Sketch," Archives of Paediatrics 30 (February 1913): 879.

26 Evidence of this is given at various points throughout the study.

27 Although the number of infant deaths was not broken down according to class, because the working classes constituted a larger proportion of the population than other classes, and because the living conditions of the former were so deplorable, it is not unlikely that infant death rates were higher among these people.

28 Ernst Christopher Meyer, Infant Mortality in New York City: A Study of the Results Accompanied by Infant-Life Saving Agencies, 1885-1920 (New York: The Rockerfeller Foundation, 1921), p. 19. The death statistics used in this study were provided by the New York City Department of Health.

29 L. Emmett Holt, The Diseases of Infancy and Childhood (New York: D. Appleton and Company, 1899), pp. 40-41. Although Holt does not cite the source of death statistics quoted, it can be assumed that these were obtained from the city health department.

30 Charles Herrman, "Suggestions for Reducing the Infant Mortality from Summer Diarrhoea," Archives of Paediatrics 24 (July 1907): 522. Statistics quoted by Herrman were taken from the annual report of the New York City Department of Health.

31 Charles Harrington, "Infantile Mortality and its Principal Cause-Dirty Milk," Paediatrics 29 (July 1907): 400. Statistics quoted by Harrington were taken from the report of the Census of 1900.

32 Allan Brown, "Infant Mortality," Canadian Medical Association Journal 4 (August 1914): 700-701. Brown compiled death statistics from figures obtained from the Third Infant Mortality Report by Dr. Helen MacMurchy, from R. E. Mills, vital statistician for Toronto, and in some cases directly from the health officers of respective cities.

33 Meyer, Infant Mortality, p. 19.

34 Herrman, "Reducing Infant Mortality," p. 522.

35 Brown, "Infant Mortality," pp. 700-701. For additional Canadian information related to gastrointestinal disturbances and infant mortality, see J. H. Elliott, "Shall We Have Pure Milk in Canada," Public Health Journal 2 (August 1911): 354; and J. A. Baudouin, "War Against Infantile Mortality," Public Health Journal 5 (May 1914): 305-307.

36 Harrington, "Infantile Mortality," pp. 401-403.

37 A. H. Gale, Epidemic Diseases (Harmondsworth, Middlesex: Penguin Books, 1959), p. 86.

38 George W. Goler, "Clean Milk," Archives of Paediatrics 27 (June 1910): 445-447.

39 Although the influence of these factors on infant mortality was difficult to measure, physicians appear to have agreed that poverty and the associated living conditions of the poor contributed to high infant mortality. Because infant mortality was high among poorer classes, some physicians went so far as to label infant mortality a "class mortality." See, for example, Harrington, "Infantile Mortality," p. 409; and Brown, "Infant Mortality," p. 693.

40 Holt, Diseases of Infancy and Childhood, p. 309.

41 Holt, Diseases of Infancy and Childhood, p. 310.

42 Henry Koplik, "Milk Poisoning Occurring in Infants and Children Who Have Been Fed Upon Pasteurized Milk: Pasteurized Milk as a Food for Infants and Children," Medical Record 53 (February 1898): 264.

43 L. Emmett Holt, "Where Does the Medical Profession Stand Today Upon the Question of Infant Feeding," Archives of Paediatrics 14 (November 1897): 816.

44 See Holt, "The Question of Infant Feeding," p. 822; and, for example, Albert R. Leeds, "On Infant Feeding," Medical News 43 (July 1883): 57; Thomas Morgan Rotch, "Some Considerations Regarding Substitute Feeding During the First Year," Archives of Paediatrics 21 (August 1904): 562. Also see those sources referred to in the discussion of breast feeding.

45 Thomas Morgan Rotch, "The Essential Principles of Infant Feeding and the Modern Methods of Applying Them," Journal of the American Medical Association 41 (August 1903): 349.

46 Joseph Brennemann, "Artificial Feeding of Infants," in Isaac A. Abt (Ed.) Paediatrics (Philadelphia: W. B. Saunders Company, 1923): 718.

47 John Zahorsky, "A Critical Study of Infant Feeding Based on Recent Analyses of Human Milk," Paediatrics 5 (June 1898): 527.

48 A. Levinson, "The Three Meigs and Their Contribution to Paediatrics," Annals of Medical History 10 (Summer 1928): 143-144.

49 See the following publications of Arthur V. Meigs: "Artificial Feeding of Infants," Medical News 41 (November 1882): 505-507; and "A Plea for the Necessity of a Common Standard for the Artificial Feeding of Infants," New York Medical Journal 43 (April 1886): 398.

50 George Byrd Harrison, "A Lecture on Artificial Feeding," Archives of Paediatrics 3 (June 1886): 343; Barton Cooke Hirst, "An Effort to Obtain a Perfect Substitute for Human Milk," Medical News 58 (January 1891): 117-118; Hill, "Modern Infant Feeding," pp. 313-314; Levinson, "The Three Meigs," p. 146.

51 Rotch's involvement in infant feeding led to his recognition as one of the founders of American Paediatrics. See, for example, Blackfan, "Past Presidents of the American Paediatric Society," p. 4; Gifford, "Founding of the American Paediatric Society," p. 371; Harry Bloch, "Thomas Morgan Rotch (1849-1914), America's First Full Professor of Paediatrics: His Contribution to the Emergence of Paediatrics as a Speciality," Paediatrics 50 (July 1972): 112-117; Cone, American Paediatrics, pp. 104; 126; 136-138; 246.

52 Hill, "Modern Infant Feeding," p. 314.

53 Thomas Morgan Rotch, "An Historical Sketch of the Development of Percentage Feeding," *New York Medical Journal* 85 (March 1907): 532-537.

54 For further information relating to the development of the percentage system see the following publications by Rotch: "The Artificial Feeding of Infants," *Archives of Paediatrics* 4 (August 1887): 458-461; "Notes on Infant Feeding," *Archives of Paediatrics* 6 (August 1889): 476-485; "Substitute Feeding," pp. 570-573; and "Historical Sketch," pp. 533-534.

55 Morse, "Recollections and Reflections," p. 303.

56 Thomas Morgan Rotch, "The Value of Milk Laboratories for the Advancement of our Knowledge of Artificial Feeding," *Archives of Paediatrics* 10 (February 1893): 97.

57 Rotch, "Historical Sketch," p. 535.

58 Rotch, "Milk Laboratories," pp. 98-100; Rotch, "Historical Sketch," p. 535.

59 Rotch, "Essential Principles of Infant Feeding," p. 416.

60 Rotch, "Historical Sketch," pp. 535-536; Thomas Morgan Rotch, "Modern Laboratory Feeding and the Wide Range of Resources Which it Provides," *Archives of Paediatrics* 25 (September 1908): 641-651; Thomas Morgan Rotch and John Lovett Morse, "Recent Advances Made in the Scientific Study of Food Stuffs and Their Application to the Nutrition of Infants," *Boston Medical and Surgical Journal* 160 (February 1909): 243-246.

61 Supportive evidence is given in the discussion of proprietary infant foods.

62 For further information regarding the relationship between physicians and infant food manufacturers, see Rima D. Apple,"'How Shall I Feed My Baby?': Infant Feeding in the United States, 1870-1940," (Doctoral Dissertation, University of Wisconsin, 1981), pp. 1-26; and Rima D. Apple, " 'To Be Used Only Under the Direction of a Physician': Commercial Infant Feeding and Medical Practice, 1870-1940," *Bulletin of the History of Medicine* 54 (Fall 1980): 402-417.

63 Charles W. Townsend, "Simplicity in Infant Feeding," *Journal of the American Medical Association* 48 (February 1907): 585.

64 Townsend, "Simplicity in Infant Feeding," p. 585. For further information relating to opposition to various aspects of percentage feeding, see Zahorsky, "Critical Study of Infant Feeding," pp. 528-529; William L. Baner, "Practical Points in Percentage Feeding," *New York Medical Journal* 69 (January 1899): 41-43; Henry Dwight Chapin, "The Limitations of Chemistry in Infant Feeding," *New York Medical*

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65 Morse, "Recollections and Reflections," p. 307.

66 Rotch, "Substitute Feeding," p. 565.

67 Although there were no figures found indicating the number of mothers who used laboratory milk, because most working class families could afford neither regular visits to a physician to obtain feeding prescriptions nor the cost of laboratory prepared formulas, milk laboratories served only the better-off classes, which, of course, constituted a smaller percentage of the population than did the working classes.

68 Thomas Morgan Rotch, "The General Principles Underlying All Good Methods of Infant Feeding," Boston Medical and Surgical Journal 129 (November 1893): 505.

69 See Bloch, "Thomas Morgan Rotch," pp. 113-114.

70 Henry L. Coit, "Certified Milk," Archives of Paediatrics 29 (August 1912): 613.

71 Harrington, "Infantile Mortality," p. 411.

72 Linnaeus Edford La Fétra, "The Development of Paediatrics in New York City," Archives of Paediatrics 49 (January 1932): 38.

73 Coit, "Certified Milk," p. 613.

74 Coit, "Certified Milk," p. 615.

75 Coit, "Certified Milk," p. 615.

76 Henry L. Coit, "Certified Milk," Archives of Paediatrics 14 (November 1897): 826.

77 Coit, "Certified Milk," p. 614.

78 M. J. Rosenau, The Milk Question (Boston & New York: Houghton Mifflin Company, 1912), pp. 144-145.

79 Henry L. Coit, "Requisite Standards for Raw Materials in the Successful Substitute Feeding of Infants," Archives of Paediatrics 29 (June 1912): 433.

80 Coit, "Requisite Standards," p. 433.

81 Rowland Godfrey Freeman, "Should All Milk Used for Infant Feeding be Heated for the Purpose of Killing Germs? If So, at What Temperature and How Long Continued?" Archives of Paediatrics 15 (July 1898): 509-511.

82 Rosenau, Milk Question, p. 150.

83 Charles E. North, American Association of Medical Milk Commissions, Proceedings, 1911, pp. 30-31, as quoted in Manfred J. Waserman, "Henry L. Coit and the Certified Milk Movement in the Development of Modern Paediatrics," Bulletin of the History of Medicine 46 (July-August 1972): 377.

84 Manfred J. Waserman, "Henry L. Coit and the Certified Milk Movement in the Development of Modern Paediatrics," Bulletin of the History of Medicine 46 (July-August 1972): 370. For slightly more detailed information related to Canadian medical milk commissions, see Elliott, "Pure Milk in Canada," pp. 355-357; and Baudouin, "War Against Infantile Mortality," pp. 307-309.

85 L. Emmett Holt et al., "Report on the Milk Supply of New York City, with Recommendations," Archives of Paediatrics 25 (February 1908): 111.

86 Holt, "Report on the Milk Supply," p. 111.

87 Wm. H. Park and L. Emmett Holt, "Report Upon the Results with Different Kinds of Pure and Impure Milk in Infant Feeding in Tenement Houses and Institutions of New York City: A Clinical and Bacteriological Study," Archives of Paediatrics 20 (December 1903): 899-900. Although infants given raw milk during the summer months frequently suffered from diarrhoea, it was found that children over three years of age who received unheated milk, containing from 145,000 to 350,000 bacteria per cc., showed almost no gastro-intestinal disturbance.

88 Rosenau, Milk Question, p. 185.

89 Rowland Godfrey Freeman, "On the Sterilization of Milk at Low Temperature," Medical Record 42 (July 1892): 8.

90 Rosenau, Milk Question, p. 189.

91 Freeman, "Heated Milk," p. 513.

92 Freeman, "Sterilization of Milk," p. 8; C. W. M. Brown, "Sterilized Milk, Pasteurized Milk or Clean Milk?" Archives of Paediatrics 20 (April 1903): 250-253; E. Mather Sill, "Is Sterilized Milk a Safe Food for Infants?" New York Medical Journal 87 (February 1908): 243; Elias H. Bartley, "Raw Cow's Milk in Infant Feeding," Paediatrics 15 (August 1903): 279-281. For more recent and detailed information related to the effect of pasteurization on the constituents of milk, see Carl W. Hall and G. Malcolm Trout, Milk Pasteurization (Westport, Connecticut: Avi Publishing Company, 1968), pp. 35-45.

93 Brown, "Sterilized Milk," p. 258.

94 Hall and Trout, Milk Pasteurization, pp. 1-20.

95 Abraham Jacobi, "Therapeutics of Infancy and Childhood," Archives of Paediatrics 6 (August 1889): 517.

96 Jacobi, "Therapeutics of Infancy and Childhood," p. 517.

97 Freeman, "Sterilization of Milk," p.8.

98 See Joseph Brennemann, "Boiled vs. Raw Milk, an Experimental Study of Milk Coagulation, Together with Clinical Observations on the Use of Boiled and Raw Milk," Journal of the American Medical Association 60 (February 1913): 575-582; and "The Use of Boiled Milk in Infant Feeding and Elsewhere," Journal of the American Medical Association 67 (November 1916): 1413-1418. For the opinion of other physicians regarding the use of boiled milk, see Proceedings of the American Medical Association, American Journal of Obstetrics and Diseases of Women and Children 70 (September 1914): 515-518 and 74 (November 1916): 915-917.

99 G. Gordon Campbell, "A Simple and Inexpensive Method of Obtaining and Pasteurizing Cream for the Preparation of Infant Food," Montreal Medical Journal 29 (March 1900): 271-272.

100 See the following articles by Henry Dwight Chapin: "Home Modification of Cow's Milk for Infant Feeding," New York Medical Journal 70 (November 1899): 657-660; "Substitute Infant Feeding," Journal of the American Medical Association 35 (July 1900): 71-74; and "A Simple and Accurate Method of Substitute Infant Feeding," New York Medical Journal 73 (February 1901): 324-327.

101 Sidney V. Haas, "A New Apparatus for the Modification of Cow's Milk at Home," New York Medical Journal 69 (February 1899): 211.

102 It is difficult to determine precisely how much attention physicians paid to the working classes. However, the general sense gained from the literature is that, within the medical profession, there was a basic awareness of the plight of working class families, although it was less prestigious and less lucrative for physicians to become involved with this class of people..

103 H. M. McClanahan, "Artificial Feeding of Infants," American Journal of Obstetrics and Diseases of Women and Children 33 (May 1896): 662-664; J. F. Connors, "A Key to the Home Modification of Bottled Milk," Archives of Paediatrics 20 (March 1902): 185-188; Maynard Ladd, "Percentage Modification of Milk in Infant Feeding," Boston Medical and Surgical Journal 148 (January 1903): 6-9; Amy L. Daniels and Honora English, "A Simple Method of Modifying the Fat Content of Milk for Infant Feeding," American Journal of Diseases of Children 17 (March 1919): 212-217.

104 Emelyn L. Coolidge, "A Simple Method of Modifying Milk in the Tenements," Archives of Paediatrics 21 (August 1904): 595.

105 See, for example, Holt, "The Question of Infant Feeding," p. 822; and Rotch, "Substitute Feeding," p. 562.

106 A. Worcester, "Breast Feeding," Boston Medical and Surgical Journal 143 (October 1900): 361.

107 M. H. Fussell, "Methods of Encouraging Breast Feeding and Contraindications to Breast Feeding," American Journal of Obstetrics and Diseases of Women and Children 16 (January 1913): 184.

108 Oscar Reiss, "Institution and Maintenance of Breast Feeding," Archives of Paediatrics 38 (May 1921): 296-297.

109 Wm. Fitch Cheney, "The Artificial Feeding of Infants," Occidental Medical Times 12 (January 1898): 66-67.

110 Joseph Edcil Winters, "The Relative Influence of Maternal and Wet Nursing on Mother and Child," Medical Record 30 (November 1886): 508; L. Emmett Holt, The Care and Feeding of Children: A Catechism for the Use of Mothers and Children's Nurses, 10th ed. (Toronto: McClelland & Stewart, 1920), p. 43; Reiss, "Breast Feeding," p. 297; John Lovett Morse, Edwin T. Wyman, and Lewis Webb Smith, The Infant and Young Child: Its Care and Feeding from Birth Until School Age: A Manual for Mothers (Philadelphia & London: W. B. Saunders Company, 1923), p. 35.

111 Winters, "Maternal and Wet Nursing," p. 506; George S. Strathy, "Lactation and Breast Feeding," Canadian Journal of Medicine and Surgery 32 (September 1912): 190.

112 Winters, "Maternal and Wet Nursing," p. 507; John T. Winter, "How Shall We Feed the Baby?" American Journal of Obstetrics and Diseases of Women and Children 33 (January 1896): 46; Louise E. Hogan, How to Feed Children: A Manual for Mothers, Nurses, and Physicians (Philadelphia: J. B. Lippincott Company, 1896), pp. 20-23; Julius H. Hess, Principles and Practice of Infant Feeding (Philadelphia: F. A. Davis Company, 1922), pp. 38-40.

113 For explicit and personal accounts of the plight of working class women, indicating the difficulties faced in feeding and caring for their children, see Margaret Llewelyn Davies, ed. Maternity: Letters from Working-Women (New York & London: W. W. Norton & Company, 1978). Prior to the 1930s, employment of married women, even in working class families, was atypical. Most mothers worked only as a means of defence against destitution. When mothers were forced to work to supplement an inadequate family income, their already considerable domestic burdens were added to. For further details related to married women workers, see Michael J. Piva, The Conditions of the Working Class in Toronto, 1900-1921 (Ottawa: University of Ottawa Press, 1979), pp. 39-43; and Leslie Woodcock Tentler, Wage-Earning Women: Industrial Work and Family Life in the United States, 1900-1930 (New York: Oxford University Press,

1979), pp. 136-179. Nonetheless, the incessant struggle of working class mothers to maintain an adequate home on an inadequate income continued well into the present century. In this regard, see Margery Spring Rice, Working Class Wives: Their Health and Conditions, 2nd ed. (London: Virago, 1981).

114 Hogan, How To Feed Children, p. 20.

115 Reiss, "Breast Feeding," p. 296.

116 Holt, Diseases of Infancy and Childhood, p. 161.

117 See Cone, American Paediatrics, pp. 55-56.

118 Holt, Diseases of Infancy and Childhood, p. 41.

119 Henry Koplik, "The Education of the Physician and Postgraduate Study in the Hygiene and Diseases of the Nursing Infant," Journal of the American Medical Association 58 (January 1913): 75-78.

120 John B. Manning, "The Duration of Breast Feeding in One Thousand Cases from Private Practice," Archives of Paediatrics 37 (April 1920): 214-222.

121 J. P. Sedgwick, "Maternal Feeding," American Journal of Obstetrics and Diseases of Women and Children 66 (November 1912): 857-865. The results of a questionnaire survey conducted by Sedgwick indicated that 80 per cent of the wives of American physicians succeeded in nursing one or more children for three months or longer. These results, while favourable, were restricted to one small segment of the population—wives of physicians—and therefore did not allow generalization beyond this. In another study, information was gathered from 400 mothers who had reared their infants on the bottle. From this information, the investigator concluded that many failures in breast feeding were preventable and that more women would have nursed their infants had they been made to realize the importance of doing so. For details of this study, see H. M. McClanahan, "Supplemental Breast Feeding in Infants," Journal of the American Medical Association 59 (November 1912): 1877-1879. For the results of yet another study, see A. Greame Mitchell, "The Duration of the Nursing Period in Women in the United States," Journal of the American Medical Association 67 (May 1916): 1690-1692. Mitchell analyzed the records of 3,000 working class infants seen at the Philadelphia Children's Hospital during a fifteen year period and found the average duration of breast feeding for the study period was six months. Also see Allan Brown, "The Ability of Mothers to Nurse Their Infants," The Canadian Medical Association Journal 7 (March 1917): 241-249, for his study results. Brown's methodology, however, was unsound and his conclusions that Canadian mothers nursed their infants less than did either American or Foreign born women, and that breast feeding had declined over the thirty years prior to his study were unjustified. Brown had also heavily plagiarized Griffith's 1912 publication on the same topic. Finally, a paediatrician's review of various European and American statistics led to the conclusion that more women could not

nurse than should have been the case among supposedly normal individuals, and that many women who did not nurse could have done so under "proper care." See, J. P. Crozier Griffith, "The Ability of Mothers to Nurse Their Children," Journal of the American Medical Association 59 (November 1912): 1874-1877.

122 This was not necessarily an indication that fewer infants from working class families were artificially fed than were infants from families of the better-off classes. The former class of people constituted a larger proportion of the population than the latter; therefore, even though it was found that a higher percentage of working class women breast fed their babies than did women from other classes, the number (not the percentage) of bottle fed infants among the working classes would still, more than likely, have been higher.

123 Again, see Davies, Maternity; and Rice, Working Class Wives, for information on the lives of working class women.

124 Sedgwick, "Maternal Feeding," pp. 864-865.

125 For further information related to this study, see William H. Davis, "Prevention of Infant Mortality by Breast Feeding," Boston Medical and Surgical Journal 166 (February 1912): 242-244; and William H. Davis, "Statistical Comparison of the Mortality of Breast Fed and Bottle Fed Infants," American Journal of Diseases of Children 5 (March 1913): 234-247.

126 For details of this study, see H. M. McClanahan, "The Relative Morbidity of Breast and Bottle Fed Infants," Archives of Paediatrics 35 (October 1918): 653-660.

127 For information related to breast milk and immunity see McClanahan, "Breast and Bottle Fed Infants," p. 657; Eleanor C. Jones, "Breast Feeding," Archives of Paediatrics 31 (January 1914): 25; and Strathy, "Lactation and Breast Feeding," p. 190. With respect to research related to breast milk conferred immunity, the work of German investigators was much further advanced than that of North Americans.

128 Thompson S. Westcott, "Modified Wet Nursing," Archives of Paediatrics 24 (March 1907): 192.

129 Holt, Diseases of Infancy and Childhood, pp. 166-167; Morse et al., The Infant and Young Child, pp. 54-55; Louis Fischer, Infant Feeding in its Relation to Health and Disease, 3rd ed. (Philadelphia: F. A. Davis Company, 1903): pp. 76-77; Isaac A. Abt, "The Technic of Wetnurse Management in Institutions," Journal of the American Medical Association 69 (August 1917): 418; Samual S. Adams, "How Shall We Feed the Baby?" Archives of Paediatrics 2 (May 1885): 275-278.

130 Cheney, "Feeding of Infants," p. 67.

131 Worcester, "Breast Feeding," p. 362; Westcott, "Modified Wet Nursing," pp. 192-193; Cheney, "Feeding of Infants," p. 67.

132 G. Carleton Jones, "Problem of Infantile Feeding," Maritime Medical News 3 (August 1894): 350.

133 Westcott, "Modified Wet Nursing," p. 193.

134 Holt, Diseases of Infancy and Childhood, pp. 155-156.

135 Rotch, "Modern Laboratory Feeding," p. 650.

136 Brennemann, "Artificial Feeding of Infants," pp. 714-719.

137 See Apple, "Commercial Infant Feeding and Medical Practice," pp. 402-417.

138 Cone, American Paediatrics, pp. 144-145.

139 Leeds, "Infant Foods," pp. 59-64; Holt, Diseases of Infancy and Childhood, p. 156.

140 Leeds, "Infant Foods," pp. 57-64; Chas Warrington Earle, "Infant Feeding," Journal of the American Medical Association 11 (August 1888): 150-155; R. H. Chittenden, "A Study of Some Infant Foods in Comparison with Mothers' Milk," New York Medical Journal 64 (July 1896): 71-75; Holt, Diseases of Infancy and Childhood, pp. 156-157; Brennemann, "Artificial Feeding," pp. 715-771.

141 Although there were no statistics found to indicate the number of infants being fed condensed milk, the general sense gathered from the literature is that it was extensively used for infant feeding.

142 Fischer, Infant Feeding, pp. 224-225; See also papers submitted under the title "The Value of Condensed Milk as a Substitute for the Mother's Milk," New York Medical Journal 101 (February 1915): 359-361; 411-412; 414.

143 Charles Gilmore Kerley, "Condensed Milk: Its Uses and Limitations in Infant Feeding," Medical News 70 (June 1897): 736.

144 Benj. Edson, "Condensed Milk for Bottle Fed Babies," Archives of Paediatrics 1 (December 1884): 746; Henry Dessau, "The Value of Condensed Milk as a Substitute for Mother's Milk," Medical Record 34 (August 1888): 208.

145 Mark S. Rueben, "Observations on Milk Station Infants," Archives of Paediatrics 31 (March 1914): 176.

146 Louise Taylor-Jones, "A Record of the First 500 Cases Cared for at the Nathan Straus Infants' Milk Depot of Washington, D.C.," Archives of Paediatrics 28 (April 1911): 266.

147 Cone, "American Paediatrics," p. 144.

148 Henry Koplik, "The Ambulatory and Hospital Management of Gastrointestinal Derangements of Infancy in the Summer Months Among the Poor of Large Cities," Archives of Paediatrics 17 (May 1900): 326.

149 Rowland Godfrey Freeman, "The Straus Milk Charity of New York City," Archives of Paediatrics 14 (November 1897): 838-844.

150 S. E. Getty, " The Sterilized Milk Dispensary of St. John's Riverside Hospital and Its Work," Archives of Paediatrics 14 (November 1897): 836-837; Rowland Godfrey Freeman, "Infant Milk Depots," Archives of Paediatrics 29 (October 1912): 728-729; Louis V. Waldron, "Milk Stations or Infant Mortality," Archives of Paediatrics 30 (April 1913): 279-281.

151 Philip Van Ingen, "Recent Progress in Infant Welfare Work," American Journal of Diseases of Children 7 (June 1914): 476.

152 Freeman, "Infant Milk Depots," p. 728.

153 Wilbur C. Phillips, "Infants' Milk Depots in the Campaign Against Infantile Mortality," Archives of Paediatrics 25 (November 1908): 865.

154 Freeman, "Straus Milk Charity," pp. 842-843.

155 Getty, "Sterilized Milk Dispensary," pp. 836-837.

156 Freeman, "Infant Milk Depots," p. 733.

157 Waldron, "Milk Stations," p. 282.

158 Meyer, Infant Mortality, p. 109.

159 Park and Holt, "Clinical and Bacteriological Study," pp. 888-894; Freeman, "Infant Milk Depots," p. 734.

160 Heurner Mullen, "History of the Organization of the Babies' Dispensary Guild, Hamilton," Public Health Journal 6 (November 1915): 542-549.

161 Brown, "Infant Mortality," pp. 699-701.

162 Freeman, "Infant Milk Depots," pp. 735-736.

163 For information related to late nineteenth and early twentieth century environmental health conditions see, John J. Hanlon, Principles of Public Health Administration, 2nd ed. (St. Louis: The C. V. Mosby Company, 1955), pp. 386-426. For a full account of the development of preventive health care also see, Herman E. Hilleboe and Granville W. Larimore, eds., Preventive Medicine: Principles of Prevention in the Occurrence and Progression of Disease, 2nd ed. (Philadelphia and London: W. B. Saunders Company, 1965).

164 Morse, "Recollections and Reflections," p. 307.

CHAPTER III

THE NURSING PERSPECTIVE

Introduction

To facilitate broader understanding of the nature of the nurs nurse-physician relationship with regard to the infant feeding problem and the contributions of nurses to the resolution of this problem, attention is first drawn to a description of the organization and status of the nursing profession during the late nineteenth and early twentieth centuries.

From Florence Nightingale's establishment in 1860 of the first British training school for nurses, the development of other hospital-based schools in England, the United States and Canada took place. In the year 1873, based on the Nightingale plan, three American training schools for nurses—Bellevue, New Haven, and Massachusetts—were opened. In the following year, 1874, based on the same plan, the first Canadian training school for nurses was established in St. Catherines, Ontario.[1]

The expansion of American training schools for nurses was extremely rapid. For instance, by 1900 there were 432 schools, and by 1920 this number had increased to 1,755. During this span of twenty years, the number of students increased from 11,164 to 54,953.[2] In Canada the growth of training schools was less rapid than in the United States; however, by 1909 seventy schools had been established.[3]

The purpose of the early training schools was twofold: first, care for patients and/or community was to be provided and, secondly, educational and career opportunities for women were to be developed.[4] The system of training was that of apprenticeship, demanding long hours in service, with little time for theoretical learning or social activities. While students were taught by their nursing superiors—many of whom in the early years of nurses' training schools had had no formal nursing education—to master the technical skills required of them, the limited amount of theory was gained from lectures usually given by physicians. Nursing was an extension of women's work in the domestic sphere and demanded, as did domesticity, complete subservience to male authority. Absolute obedience to one's superiors, in particular, physicians, was the foremost lesson to be learned by nursing trainees.[5] Nursing education, as one early twentieth century nurse proclaimed, was to proceed along "practical, ethical and altruistic" lines, while avoiding "too much" time being spent on increasing theoretical knowledge, because, after all, it was thought necessary for nurses to study only "some of the wonderful things the doctors [knew]."[6]

Although modern nursing training was intended to rescue the care of the sick from the hands of the uneducated nurses, often of undesirable character, of the pre-Nightingale era, the deprived conditions—long hours of heavy physical labour, lack of social life, inadequate living quarters, and low wages—of nurses, attracted, on the whole, working class women who had as options to nursing, factory work or domestic labour.[7] Contrary to this, one of the objectives of the Nightingale plan had been to attract educated gentlewomen of good repute, who would thus be capable of becoming trained as nurses.[8] Nevertheless, whether or not from a working class background, and regardless of the middle class social, moral and ethical values upheld in nursing schools, extensive contact with the sick poor during hospital training served to promote greater awareness on the nurse's part of the problems associated with working class families.[9]

Despite the low standards of the early training schools, the often deplorable conditions under which nurses worked, and the exploitation of nursing service to the benefit of the hospital and to the detriment of nursing education, the number of graduates from schools of nursing in the United States increased with astounding rapidity. In 1880, for instance, there were 157 graduate or trained nurses, while by 1920 this figure had increased to 14,980.[10] In Canada, where there were fewer training schools, there were, by 1911, 5,476 trained nurses and by 1921 the number of graduates and nurses in training combined was 21,162.[11] The major fields open to the trained nurse were educational, institutional, private duty, and public health nursing. In the educational field were included head nurses, nursing instructors, nursing supervisors, and directors of training schools. In the institutional setting, hospital superintendents and head nurses of wards were to be found. Additionally, as the twentieth century progressed, more trained nurses were being employed on a staff basis in hospitals.[12] However, because hospitals usually relied on student nurses to provide patient care, the number of trained nurses who sought private duty work, which involved bedside care of the sick in their own homes, was considerably higher than for other fields. For instance, it was estimated that, prior to 1900, 85 per cent of Canadian trained nurses were engaged in private duty nursing.[13]

The fourth and most rapidly developing field of nursing during the early decades of the twentieth century was public health. The areas of health care covered by public health nursing included maternity and child welfare, communicable disease prevention, school and industrial nursing, and care of the sick poor in their own homes. Public health nursing in North America originated in 1877 when the Women's Branch of the New York City Missions established a visiting nursing service for the city's poor.[14] In Canada, visiting nurse services were provided by some religious orders; however, in 1897 the Victorian Order of Nurses was formed to provide public health nursing services in sparsely settled areas of the country as well as in urban slums.[15] As with other facets of nursing, the expansion of public health nursing was more rapid in the United States, where by 1921 there were 11,000 trained nurses working in the field of public health,[16] while in Canada by 1922, where the general population was considerably lower than that in the United States, there were 1,000 public health nurses.[17]

Although in the early decades of the 1900s, training beyond that acquired at a hospital school of nursing was not deemed necessary for public health nurses, specialized training was eventually thought essential if nurses were to fulfill this role adequately. For instance, the Report of the Committee for the Study of Nursing Education published in 1923 recommended that special public health training, covering an academic year of eight or nine months, should be given at the completion of a basic clinical training program.[18] However, by 1935 public health nursing education in the United States was described as progressing along three definite lines: postgraduate courses taken at universities, colleges or other schools of collegiate level in affiliation with a public health nursing agency; student nurse affiliation whereby undergraduate students received, as part of their basic training, a short period of training with a public health nursing organization; and staff instruction offering a variety of forms of educational opportunity to staffs of public health nursing organizations.[19]

The Survey of Nursing Education in Canada published in 1932 recommended as the minimum educational qualifications for public health nurses completion of a four or five-year course in public health nursing offered by Canadian or other universities. An acceptable alternative was a three-year course in general nursing in an approved training school followed by at least one year successful experience in private duty or institutional nursing and completion of a one-year course in public health nursing offered by an approved university training school.[20]

With regard to the establishment of specialized public health nursing education, the Canadian Red Cross Society played an important role by providing funding to a number of Canadian Universities. In 1920 the first course in public health nursing to be offered by a Canadian University was established at Dalhousie University, Halifax, and by 1921 it was reported that:

> with the cooperation of the Provincial branches of the Canadian Red Cross, the past year has brought amazing developments in Public Health Nursing. The interest of the universities has been aroused in the education of Public Health Nurses. Courses in Public Health Nursing, with a total enrollment of 148 graduate nurses, have already begun in six Canadian Universities.[21]

The additional five universities offering a certificate course in public health nursing were the University of British Columbia, McGill University, the University of Toronto, the University of Western Ontario, and the University of Alberta. With the exception of the latter, where an abbreviated course of four months was offered, all courses covered one academic year and were funded by the Canadian Red Cross Society.[22] However, prior to the initiation of public health nursing courses at Canadian universities, Canadian nurses willing to undertake such training were compelled to do so in the United States, often not returning to Canada on completion of training but instead taking a nursing position in the United States.[23]

In general, so far as university education for nurses was concerned, the first university classes for nurses were established at Teachers College, Columbia University in 1899. In 1908, the School of Nursing, University of Minnesota was the first to offer basic nursing training under university auspices, and in 1916, two five-year programs leading to a baccalaureate degree were established at Columbia Teachers College and the University of Cincinnati.[24] The first nursing degree program in Canada was started at the University of British Columbia in 1919 and by 1926, eight Canadian universities were offering at least one type of course for nurses.[25]

In addition to the introduction of university education for nurses, the "standard curriculum" developed in 1917 to provide concrete suggestions on how to improve the standards in schools of nursing and guidelines on how to set up actual courses, was hailed at the time as being "by far the most significant development in nursing education" in the United States.[26]

The standard curriculum was developed by the Education Committee of the National League of Nursing Education with the distinguished nursing leader, M. Adelaide Nutting, as chairman. The curriculum was based on a number of generally accepted beliefs. For instance, the four essential fields of practice were assumed to be those of medicine, surgery, paediatrics, and obstetrics. Additionally, it was thought that all nursing subjects should emphasize the social and health point of view, although public health nursing as such was considered a special branch of nursing requiring specialized training. Moreover, based on the belief that nurses required additional theoretical knowledge, the standard curriculum relegated approximately six hundred hours to be spent in classroom learning. Nonetheless, approximately seven thousand hours were still to be spent in practical work.[27]

In 1924, revision of the standard curriculum was undertaken, and in 1927 a new curriculum was published. The new curriculum was based on the belief that nurses were essentially teachers and agents of health, and therefore nursing education should stress the social, preventive and teaching aspects of nursing. Thus the number of classroom hours devoted to the sciences, the principles and practice of nursing, and to other nursing subjects were increased, and an advanced course in nursing was introduced to include teaching on many new technical procedures. The total number of hours to be spent on theoretical work was increased by approximately 125 hours over the number of hours recommended in the standard curriculum. However, the most important change in the curriculum was thought to have been the change in the focus of study from the process and treatment of disease to the social causes of disease and the measures to protect health.[28]

The number of classroom and laboratory hours recommended in the revised curriculum covered a wide range of subjects including anatomy and physiology, bacteriology, general and applied chemistry, materia medica, dietetics, principles and practice of general and speciality nursing, and history and ethics of nursing, and modern social and health movements. So far as paediatric nursing and infant feeding were concerned, the recommendation was that thirty hours be devoted to classroom and laboratory instruction, while three months were to be spent gaining practical experience caring for sick and well children.[29]

However, despite the recommendations made by the National League of Nursing Education in the new curriculum, in the early 1930s an analysis of the curricula in the schools of nursing in New York State revealed marked lack of agreement as to what was essential. For example, the number of hours allotted to anatomy and physiology ranged from 48 to 270, bacteriology from 20 to 120, chemistry from zero to 315, elementary nursing procedures from 79 to 325, advanced nursing from zero to 174, and paediatrics (including infant feeding and orthopaedics) from 11 to 116. Additionally, it was found that students received experience according to the services offered at the individual hospital. For instance, the number of days spent in paediatric nursing was found to vary from 56 to 379, and in public health nursing from zero to 92.[30]

Nonetheless, regardless of the inadequacies in the early development of modern nursing, nurses identified their role as one of significance and considered themselves as collectively forming a professional body. However, as the renowned nursing leader, Isabel Hampton Robb, pointed out in 1900, nurses of the late nineteenth century could not qualify as professionals because, collectively, they lacked the essential elements of organization and legislation.[31] Nor did nurses possess a body of specialized knowledge exclusive to nursing. During the early decades of modern nursing, the nurse's duties and her methods of training were dictated by hospital committees and groups of physicians. Not until nurses united to seek standardization for nursing education and laws to insure competency in practice did nursing begin to gain status.[32] Thus, in 1893, the American Society of Superintendents of Training Schools for Nurses was established to promote fellowship of members; to establish a universal standard of education; and to promote the best interests of nursing as a profession. Subsequently, in 1896 the Nurses' Associated Alumnae of the United States and Canada was formed to elevate the level of nursing education and the standards of nursing practice.[33] In 1911 the Associated Alumnae became the American Nurses' Association.[34]

In 1900, owing to regulations associated with United States health legislation, Canadian nursing groups withdrew affiliation with their American counterparts.[35] Consequently, in 1907 the Canadian Society of Superintendents of Training Schools for Nurses was formed with the following objectives:

> ...to consider all questions relating to nursing education; to define and maintain in schools of nursing throughout the country minimum standards for admission and graduation; to assist in furthering all matters pertaining to public health; to aid in all measures for public good by cooperation with other educational bodies, philanthropic and social; to promote by meetings, papers, and discussions, cordial professional relations and fellowship; and in all ways to develop and maintain the highest ideals in the nursing profession.[36]

The Canadian National Association of Trained Nurses was formed in the following year, 1908. By 1924 each province had a nurses' organization with membership in the national group, which, in that year, changed its name to the Canadian Nurses Association.[37]

So far as nursing journals were concerned, the earliest publications "were dedicated to communicating problems and objectives of the nursing profession to nurses on a national basis."[38] The first

American nursing journal was The Nightingale, which began publication in 1886, and was absorbed by The Trained Nurse, first published in 1888.[39] The American Journal of Nursing began publication in 1900, and The Canadian Nurse in 1905.[40] Both journals were to serve as an important means of communication for nurses throughout the United States and Canada. Much of the material included in these publications related to educational and organizational developments within the profession. Additionally, nurses contributed articles detailing their work experiences.

However, notwithstanding the relentless efforts of the pioneers of modern nursing, in 1920, well-trained nurses and well-prepared nursing administrators and educators were still in great demand. The need for marked improvements in standards of nursing education, in methods of training, in requirements for entry to nursing schools, and in conditions under which nurses worked continued to be obvious. While the apprenticeship method of training had in other fields long since become obsolete, it still survived in most schools of nursing, thus perpetuating the conflict between the educational interests of the training school and the economic interests of the hospital.[41] For decades to follow, this conflict seriously hindered the elevation of the professional status of nurses. While society deemed it acceptable for women to be subjected to the servitude of hospital nursing training, university education—without which professional advancement was made difficult—was still considered unnecessary for most women.[42]

Thus, the insufficiencies of the nursing profession compelled its members to fill a position inferior to that of physicians. As pointed out in the preceeding chapter, physicians were not without their shortcomings; however, despite these, the advantages of physicians over nurses were many, not least of which was the reality that medicine was a male dominated profession, developing and organizing within a male dominated society. Additionally, formal medical education, although of inferior quality, had become a reality long before the Nightingale era of nursing. Moreover, while physicians may have spent many hours in daily practice, unlike nurses, it was both economically and socially rewarding for them to have done so. However, while social, economic and educational restraints cast nurses into a professionally inferior position, they were more competent than some physicians would have had one believe. For instance, so far as the care and feeding of infants was concerned, nurses fulfilled, in an efficient and dedicated manner, a very important role. As one nurse wrote, "the nurse is an important member of that devoted band of workers...striving to lower infant mortality and to better conditions in general for children."[43] Infant feeding was considered an "intensely interesting" subject,[44] and the association between infant feeding practices and high infant mortality was well recognized by nurses.[45] As another nurse pointed out, "in no public health movement has nursing had a more active part than in [preventing] infant mortality."[46]

So far as infant feeding was concerned, nurses identified their professional responsibility as that of doing what physicians decreed they should do. In this regard, so as to understand the superior-subordinate relationship between physician and nurse, certain aspects of infant feeding included in the nursing literature of the period, are discussed in the following. Specifically, the attitude of nurses regarding breast feeding, their involvement in artificial feeding, including pasteurization, sterilization and modification of milk, and the use of proprietary infant foods, all serve to demonstrate the pervasive influence of the medical profession over the nursing care of infants. Additionally, inclusion of the role of milk depot nurses serves to emphasize the superior-subordinate nature of the physician-nurse relationship, as well as indicating further the significance of the impact nurses had on the infant feeding problem.

Maternal Nursing and Wet Nursing

Where breast feeding was concerned, the influence of physicians was reflected in the general concensus of nursing opinion that women should breast feed their infants. Nurses were aware of the advantages of breast milk and considered it their duty to encourage mothers to breast feed. As one nurse wrote, "it is our duty in our capacity as public health educators to make the mother feel that it is a divine privilege rather than an irksome duty to nurse her child." She went on to say that no mother was justified in weaning her infant unless acute or chronic illness prevented her from breast feeding.[47] The belief that women were morally bound to nurse their babies was evident in the writing of another nurse, who having pointed out that the natural infant food was the milk of its mother, continued by stating that:

> God has given every baby a birthright and that is its mother's milk, and it is just as criminal to deny a baby breast milk as it would to destroy its life before it could claim that right.[48]

For this nurse, "proving her loyalty to her profession" lay in convincing mothers to breast feed. She did, however, indicate that "no one but a physician should undertake the grave responsibility of deciding whether a mother should discontinue breast feeding."[49] Yet another nurse involved in infant welfare work indicated the advice she and her colleagues gave regarding breast feeding was that "if you love your baby, nurse it." This directive was followed by the information that mother's milk was the best food for babies and that a breast fed baby had ten times more likelihood than a bottle fed baby of surviving the first year of life.[50]

There seems to be little doubt that the ideas and opinions of nurses, regarding infant feeding, were highly influenced by physicians. For example, in two nursing textbooks written by physicians, it was made clear that mothers were expected to breast feed their infants. Women were said to fail in their attempts to breast feed because they did not lead "sensible" lives. If pleasures or social duties were allowed to interfere with nursing, the woman was considered unworthy of being either woman or mother. Thus, having been taught the middle class male attitudes of physicians, with regard to breast feeding, nurses, regardless of their own social background, were expected to encourage mothers to nurse their infants.[51]

In a paediatric textbook written by a nurse, using information from the publications of medical authorities such as Jacobi, Sedgwick and Griffith, the author pointed out that 95 per cent of mothers were able to nurse their babies if given proper prenatal care and supervision and instruction following delivery. However, notwithstanding the 5 per cent of women who for reasons of ill health were unable to breast feed, it was stated that "it [was] every infant's right to have breast milk, and it [was] every mother's duty and privilege to nurse her baby."[52] and, apparently, every nurse's obligation to ensure that mothers fulfilled their duty. Nonetheless, at least one nurse, formerly a member of the Breast Feeding Investigation Bureau of the Department of Paediatrics, University of Minnesota, avoided using the word "duty" as much as possible in her work with nursing mothers. This nurse believed that, with a consistent infant weight gain associated with breast feeding, mothers could "easily be made to see" that breast milk was by far the best infant food. In addition, given the necessary supervision in establishing lactation, breast feeding "became as much a part of motherhood as [was] pregnancy."[53]

At a time when the ideas and actions of men dominated all aspects of society, nurses, by virtue of the fact that they were women, were obviously easily influenced by the teaching of physicians. Although late nineteenth and early twentieth century medical educators left much to be desired, the beginnings of a scientific basis for both education and practice were obvious. In contrast to this, nursing education and practice lacked scientific grounding and emphasized the practical details of nurses' work. As one nurse wrote in the early 1900s:

> A good infants' physician has not only a wide and unprejudiced knowledge of the subject [infant feeding], but infinite patience, adaptability, and resource, and the best infants' nurse is the one to whom no slightest detail of hygiene, absolute cleanliness, regularity, or comfort is anything less than of the utmost importance.[54]

The establishment of breast feeding, for example, was the physician's prerogative, the necessary practical details of follow-up care being attended to by the nurse. As one Canadian physician well known for her involvement in infant welfare work, wrote in a 1914 issue of the Canadian Nurse, "where the doctor personally and thoroughly manages the establishment of nursing," she had never known a case where a mother could not nurse her baby.[55]

The practical nursing skills related to breast feeding covered areas such as care of the breasts prior to and following delivery; diet, rest and exercise for nursing mothers; the technique of breast feeding; and the hygienic management of infants. The actual care of the infant involved keeping it fed, warm and dry, although of equal importance was the establishment of a feeding schedule dictated by the hour of the day rather than by the infant's indication of hunger.[56]

As was the case with maternal nursing, the attitudes and actions of nurses with regard to wet nursing were also influenced by the medical profession. Even though there was little found in the nursing literature regarding wet nursing, nursing opinion held that if a mother was unable to nurse her infant the best substitute was a wet nurse. However, the problems associated with procuring a suitable wet nurse caused this alternative method of feeding to be infrequently recommended.[57] As one nurse wrote:

> The most perfect substitute [for maternal nursing]... is a wet-nurse whose own infant is of the same age as the child whose normal nourishment is denied it. This being difficult and in many cases impossible to provide, recourse is usually had to some other animal milk than the human.[58]

Nonetheless, in the event that a wet nurse was available, she was not to be employed without "a physician's certificate of health and his endorsement."[59] When mentioned, the characteristics of a wet nurse were fundamentally the same as those found in the medical literature: she was to be a healthy, robust woman no older than thirty years, free from anxiety, and with a good milk supply.[60]

Choice of Formula

Although according to the literature nurses agreed that, if breast feeding was not possible, modified cow's milk was the most suitable substitute for breast milk,[61] it was the duty of the physician to prescribe the infant's modified cow's milk formula. A nurse was not permitted to prescribe an infant formula any more than she was permitted to prescribe a drug. The physician wrote the formula for milk modification and the nurse followed his directions with the "utmost exactness."[62] As was pointed out in the chapter on infant feeding in one nursing textbook:

> It is no part of a nurse's duty to prescribe an artificial food for a baby nor to question the wisdom of any food which the physician may prescribe.[63]

Since modified milk formulae, wrote another nurse, required "an intimate knowledge and education in chemistry, bacteriology, anatomy, etc.," nurses could only be expected to possess a general "working knowledge" of the underlying principles involved in formula preparation.[64] While the steadily developing scientific basis of medical education provided physicians with additional knowledge, nursing education emphasized practical details. Hence, based on their knowledge of the sciences, limited though it was, physicians decided what infants were to be fed and nurses prepared the infants' formulae accordingly. Until nurses developed a knowledge base upon which nursing practice could grow, the medical profession would continue to control that practice. Whether physicians viewed their control of nursing practice as assisting with the medical monopolization of child health care is unclear; however, without a body of nursing knowledge, which would facilitate professional accountability, nurses were defenceless against the power of the medical profession.

For nurses involved in infant health care, a large part of their work involved the preparation of milk for infant feeding. Since they were not expected, in fact they were forbidden, to choose or recommend specific formulae, nurses devoted much of their time to ensuring that the milk used for infant feeding was pure, and that bottles, nipples and the utensils used for formula preparation were scrupulously clean. Additionally, nurses were responsible for teaching mothers these practical details of formula preparation.[65] As was described by one nurse:

> She, the mother, is taught to carefully wash her own hands as well as to boil the bottles. As she prepares her own baby's milk she realizes the responsibility and the importance of each detail. To be sure that the mother is ever thoughtful of the care of the milk, the nurse uses persistency in preaching the gospel of the three c's, keep the milk cool, covered and clear.[66]

These practical duties were accepted by nurses as an essential element of their involvement in infant health.

Pasteurization and Sterilization

Since the milk supply was known to be unreliable, home pasteurization or sterilization were resorted to as a means of ensuring purity of the milk used for infant feeding. According to the literature, methods of home pasteurization and sterilization were used by nurses. So far as the digestibility of boiled milk was concerned, nurses were influenced by the early medical teaching that it was more difficult to digest than was raw milk. However, the later knowledge that boiled milk was in fact the more easily digested of the two, was readily accepted by nurses, as was the awareness of the need, when using boiled milk, to supplement the infant's diet with orange juice to prevent the development of scurvy. All that was required to sterilize milk was a large saucepan in which the milk could be boiled. To pasteurize milk, a double boiler or, depending on the economic circumstances of the family, a pasteurizing apparatus was used.[67]

Milk Modification

Regarding the actual method of modification, top milk or cream preparations were frequently recommended. With the use of a siphon or a cream dipper (as developed by Chapin), the cream was separated from the milk, then the prescribed portions of crea, fat-free milk, sugar and any other ingredient ordered, were mixed and bottled for feeding.[68] The milk modification known as Mieg's mixture, consisting of two parts cream, one part milk, three parts lime water, and three parts sugar of milk, was a widely used modification and one with which nurses were expected to be familiar.[69] There was very little reference in the nursing literature to Rotch's percentage formula preparations, other than to point out that his system was accurate and had been successfully used.[70] However, since Rotch did not intend percentage feeding to lend itself to home modification, for nurses there was no practical advantage to learning the intricate details of his system.

Proprietary Infant Foods

Since nurses appeared to accept without question the authoritative position of physicians regarding infant feeding, it is not surprising that they agreed with physicians that proprietary baby foods should be used only under medical direction. Although not all commercially manufactured foods were detrimental to infant health, nurses were advised to be exceedingly cautious about giving advice regarding proprietary foods to enquiring mothers. Parents were warned against being lured by the attractive advertisements of the manufacturers and the ease with which these foods were prepared, and were encouraged to seek medical advice regarding their infant's diet. When proprietary foods were ordered by a physician with definite indications for their temporary use, and provided they were used in connection with milk, they were considered a safe and valuable adjunct to the infant's diet.[71] As was the case with other aspects of infant feeding, when using commercially manufactured preparations, nurses followed the physician's directions.

Infant Milk Depots

As mentioned previously (see p. 47), milk depots, or stations, were usually managed by trained nurses who worked under the supervision of physicians. There was usually one nurse assigned to each depot, with an additional nurse during the summer months. Thus the number of nurses involved in milk depot work was determined according to the number of milk depots established in a given city. For example, in New York City, where in 1914 there were ninety-one milk depots, it is logical to estimate that there would have been a comparable number of nurses employed, with an increase in this number during the summer months.[72] The fewer milk depots per city, the smaller the number of nurses involved in this type of work. Montreal, for instance, had twenty-seven milk depots in 1914; in Toronto there were eleven; and in Ottawa, four.[73]

Although initially milk depots were established to provide pure milk at a cost that most families from the poorer classes could afford, other services were soon introduced, involving both nursing and medical activities. In addition to providing pure milk, mothers were advised and instructed regarding the care and feeding of their infants. Apart from managerial responsibilities, nurses prepared and dispensed milk; served as the physician's assistant when baby consultations or mothers' meetings were held; gave practical demonstrations of milk modification, care of feeding utensils and bathing and clothing babies; and conducted follow-up visits to the homes of infants seen at the depot.[74] As was written by a nurse involved in milk station work:

> Each nurse has a stated hour for dispensing the milk, after which she visits the families that receive it, giving instruction to the mother on the care of the babies....The nurse also examines all infants under three years old who are reported ill, and advises the mothers to consult their family physician. If they have no family physician they are referred to the physician in charge of the clinic connected with each station.[75]

Even though nurses involved in milk depot work appeared well informed in matters of infant care and capable of conducting their work independent of consistent medical supervision, it is difficult to determine whether physicians felt it necessary to control the activities of nurses because they truly believed them incompetent or whether their control was used as a means of keeping infant and child care under medical jurisdiction. However, it is not surprising that, at a time when the authority of physicians was infrequently questioned, nurses gave no indication that they were opposed to functioning under medical supervision. Despite the confines of medical direction, the work of milk depot nurses appeared to provide them with a source of great satisfaction. As one nurse wrote, milk depot nurses

> were alert to the purpose of the work, and enthusiastic in meeting the needs of the neighbourhood...every nurse worked with a definite purpose of keeping all the children in her district well, and many babies owe their lives either to prompt and faithful nursing or to painstaking supervision of their diet and home life.[76]

Additionally, another nurse pointed out, with reference to the work of milk depot nurses, that by promoting good health in infancy, "we [milk depot nurses] aim not for the 'better day', but rather the 'best baby'."[77]

When not involved in one of the duties mentioned above, nurses were often found canvassing their respective districts, encouraging mothers not yet enrolled at a milk depot to attend a baby consultation or mother's meeting. At consultations, infants were weighed and examined by a physician, who then advised each mother regarding her infant's care, the advice given then being reinforced by the nurse in attendance.[78] However, probably more gratifying than the work done at consultations, were the positive results accomplished at mother's meetings. These were held once or twice monthly; lectures were given by physicians, and mothers were provided with an opportunity to ask questions in relation to the care and feeding of their infants. As a learning resource, these meetings were considered invaluable, although the free exchange of information among mothers while refreshments were being served was thought to produce results equal in value to those produced by the physician's lecture. Nonetheless, whatever the mothers in attendance learned from the physician's lecture was diligently reinforced by the nurse's practical demonstrations and instruction.[79]

In addition to providing well-child care, milk depot nurses were also involved in caring for sick infants. These infants were referred by the nurse for medical attention, and if the nurse did not carry out the recommended medical treatment herself, she made frequent home visits to ensure that mothers did. Needless to say, diarrhoea was one of the most frequently encountered maladies, the common treatments for which were intestinal irrigations and the administration of purgatives. As was reported by one nurse:

> Nearly all our babies were brought to us in bad condition from improper feeding...in such cases a saline irrigation, a dose of castor oil and an order for barley water feedings had to be resorted to without a moment's delay, and we saved more lives during the summer campaign by this 'first aid' work...than by any other means.[80]

Milk depot nurses made a vital contribution to the reduction of infant mortality. Although the work of these nurses was not often praised in medical literature, the evidence indicates that the impact of their work was substantial. Moreover, the consistent increase in the number of mothers and babies attending milk depots was an indication of the public support given these facilities. So far as actual decreases in the number of infant deaths were concerned, during six years of milk depot work in Rochester, New York, for instance, there was a fall of 65 per cent in the mortality rate of infants under one year.[81] In Hamilton, Ontario, a reduction of 30 per cent in infant deaths attributed to cholera infantum (severe diarrhoea) was thought to have been brought about by the work of the Victorian Order of Nurses, which established a milk distribution and infant care centre in this city in 1909.[82] Additionally, statistics quoted previously (see pp. 49-51), support the association between the establishment of milk depots and declining infant mortality rates. Although pure milk for infant feeding was absolutely essential, it was also essential that mothers have some knowledge of modifying and caring for milk in the home, and of adequate infant care. It appears that without the services of milk depot nurses, mothers of the poorer classes may not have become familiar with the principles essential to keeping their babies alive.

Summary

As can be gathered from the foregoing, early twentieth century trained nurses played an important role in the care and feeding of infants. However, whether involved in encouraging women to breast feed or assisting them to overcome the hazards of bottle feeding, the work of nurses entailed the application of practical skills; while physicians made the decisions as to how and what infants should be fed, nurses did the necessary work related to these decisions. Nurses were not expected to decide what a particular infant was to be fed because nursing opinion held that while physicians possessed the scientific knowledge necessary to prescribing appropriate milk formulas for infant feeding, nurses were only expected to know how to prepare these formulas. Thus, when caring for infants who were not breast fed, nurses devoted much of their time to the practical details of formula preparation. When not teaching mothers how to modify, sterilize or pasteurize milk; clean bottles, nipples and utensils used for formula preparation; and how to attend to the personal hygiene of their infants, nurses performed these tasks themselves.

In their capacity as milk depot workers, again working under medical direction, nurses played a significant role in overcoming the difficulties associated with artificial infant feeding, by efficiently carrying out a variety of duties including the preparation and dispensing of milk, canvassing their respective districts to encourage mothers to attend baby consultations and mothers' meetings, acting as the physician's assistant at these consultations and meetings, and conducting follow-up visits to the homes of infants seen at the depot. Thus, despite medical opinion that nurses lacked the necessary knowledge to undertake, without medical supervision, the care and feeding of infants, nurses—particularly those involved in milk depot work—made a significant contribution to the great improvements in the standards of infant care brought about during the first two decades of this century.

Notes to Chapter III

1 For further information related to the development of the early American and Canadian training schools for nurses see G.H. Greene, "Canadian Training Schools for Nurses," Canadian Nurse 4 (November 1908): 596; 601; Norma E. Anderson, "The Historical Development of American Nursing Education," Journal of Nursing Education 20 (January 1981): 22-24; Margaret May Allemang, "Nursing Education in the United States and Canada, 1873-1950: Leading Figures, Forces, and Views on Education." (Doctoral Dissertation, University of Washington, 1974) pp. 1-41; Judi Coburn, " 'I See and Am Silent': A Short History of Nursing in Ontario," in Women at Work, Ontario, 1850-1930, ed. Linda Kealy (Toronto: Canadian Women's Educational Press, 1974), pp. 135-145; and John Murray Gibbon, Three Centuries of Canadian Nursing (Toronto: The MacMillan Company of Canada, Limited, 1947), pp. 143-145.

2 The Committee for the Study of Nursing Education, Nursing and Nursing Education in the United States (New York: The MacMillan Company, 1923), p. 188.

3 Gibbon, p. 155.

4 Anderson, "American Nursing Education," p. 23.

5 Coburn, I See and Am Silent, pp. 139-144; Allemang, "Nursing Education," pp. 14-17; 29-34.

6 J. F. Botting, "What is a Nurse?" Canadian Nurse 8 (December 1912): 661.

7 Coburn, I See and Am Silent, p. 138.

8 Allemang, "Nursing Education in the United States and Canada," pp. 17-21.

9 As pointed out in the previous chapter, although physicians may have been aware of working class conditions, because many of them concentrated their efforts on establishing private practices where, on the whole, people of the better-off classes were seen, they had less contact with working class families and, therefore, possibly understood the problems associated with this class of people to a lesser extent than did nurses. As a result of their work with the sick poor, nurses learned the intricacies of having their patients understand and carry out the desired course of medical treatment. For further information regarding the working relationship of nurses to poorer class families see, for example, Lilian D. Wald, The House on Henry Street (New York: Henry Holt and Company, 1915); G. T. Barrow, "District Nursing," Canadian Nurse 4 (August 1908): 368-371; "Nurses in Many Homes," Canadian Nurse 11 (May 1915): 262-263; Mary Ard. MacKenzie, "District Nursing," Public Health Nursing Quarterly 7 (January 1915): 30-31.

10 Committee on the Grading of Nursing Schools, Nursing Schools Today and Tomorrow, (New York: Committee on the Grading of Nursing Schools, 1934) p. 24.

11 Gibbon, *Canadian Nursing*, p. 373.

12 Committee on the Grading of Nursing Schools, *Nursing Schools Today and Tomorrow*, pp. 43-44.

13 Gibbon, *Canadian Nursing*, p. 163.

14 The Committee for the Study of Nursing Education, *Nursing and Nursing Education in the United States*, pp. 41-42.

15 Gibbon, *Canadian Nursing*, pp. 267-272.

16 The Committee for the Study of Nursing Education, *Nursing and Nursing Education in the United States*, p. 42.

17 Coburn, *I See and Am Silent*, p. 145.

18 The Committee for the Study of Nursing Education, *Nursing and Nursing Education in the United States*, pp. 148-149.

19 Mary Sewell Gardner, *Public Health Nursing*, 3rd ed. (New York: The MacMillan Company, 1936), p. 111.

20 G. M. Weir, *Survey of Nursing Education in Canada* (Toronto: (Toronto: The University of Toronto Press, 1932), p. 141.

21 The Canadian Red Cross Society, *The Role of One Voluntary Organization in Canada's Health Services: A brief presented to the Royal Commission of Health Services on behalf of the Central Council of the Canadian Red Cross Society* (Toronto: Canadian Red Cross Society, 1962), p. 98.

22 Canadian Red Cross Society, *The Role of One Voluntary Organization in Canada's Health Services*, pp. 98-99.

23 Gardner, *Public Health Nursing*, p. 114.

24 Anderson, "American Nursing Education," p. 26.

25 Canadian Nurses' Association, *The Leaf and the Lamp* (Ottawa: Canadian Nurses' Association, 1968), p. 33. For a full account of the development in Canada of university education for nurses, see Janet Catherine Ross Kerr, "Financing University Nursing Education in Canada: 1919-1976," (Doctoral Dissertation, University of Michigan, 1978). For information related to the early development of Canadian University education for nurses, particular attention should be paid to pp. 41-94.

26 Ella Phillips Crandall, "How are Schools of Nursing Obligated to Prepare Students for Public Health Nursing," *Canadian Nurse* 13 (September 1917): 544.

27 Allemang, "Nursing Education in the United States and Canada," pp. 131-132.

28 Allemang, "Nursing Education in the United States and Canada," pp. 134-135.

29 Committee on Education of the National League of Nursing Education, A Curriculum for Schools of Nursing (New York: National League of Nursing Education, 1932), pp. 61-62; 54.

30 Philip A. Kalisch and Beatrice J. Kalisch, The Advance of American Nursing (Boston: Little, Brown and Company, 1978), pp. 355-357.

31 Isabel Hampton-Robb, "President's Address," Proceedings of the Third Annual Convention (May 3-5, 1900) of the Associated Alumnae of Trained Nurses (Cleveland: J. B. Savage Print, 1900), p. 46, as cited in Lyndia Flanagan, One Strong Voice: The Story of the American Nurses' Association (Kansas City, Missouri: American Nurses' Association, 1976), p. 23. With relation to the professionalization of nursing see, Shirley Marie Stinson, "Deprofessionalization in Nursing?" (Doctoral Dissertation, Teachers College, Columbia University, 1969). In this study, professionalization of nursing in the 1920s and 1960s is compared. It was concluded that, within the social context of the times, a greater degree of professionalization in nursing was evident in the 1920s than in the 1960s.

32 Lyndia Flanagan, One Strong Voice: The Story of the American Nurses' Association (Kansas City, Missouri: American Nurses' Association, 1976), pp. 23-24.

33 Flanagan, The Story of the American Nurses' Association, pp. 29-30.

34 Flanagan, The Story of the American Nurses' Association, p. 50.

35 Canadian Nurses' Association, The Leaf and The Lamp, p. 35.

36 Canadian Nurses' Association, The Leaf and The Lamp, p. 36.

37 Canadian Nurses' Association, The Leaf and The Lamp, pp. 36-381

38 Canadian Nurses' Association, The Leaf and The Lamp, p. 71.

39 Virginia A. Turner, "Margaret Elliot Francis Sirch," Nursing World (August 1960): 11-13.

40 Canadian Nurses' Association, The Leaf and The Lamp, p. 71.

41 Adelaide Nutting, "The Outlook of Nursing," Public Health Nurse 12 (September 1920): 754-765.

42 See Muriel Elizabeth Chapman, "Nursing Education and the Movement for Higher Education for Women: A Study in Interrelationship, 1870-1900," (Doctoral Dissertation, Teachers College, Columbia University, 1969), pp. 514-532.

43 M. B. McClelland, "Milk Fund Association Nursing," American Journal of Nursing 14 (October 1913): 18.

44 Marion Balfour Chalmers, "The Care and Feeding of Babies," American Journal of Nursing 13 (February 1913): 355.

45 See E. Ida McCune, "How Certified Milk Lessens Infant Mortality," Nurses' Journal of the Pacific Coast 7 (January 1911): 19; Helen M. W. Smith, "Child Welfare," Canadian Nurse 10 (October 1914): 593; Helen R. MacDonald, "Work of Babies' Dispensary Guild, Hamilton, Ontario," Canadian Nurse 13 (September 1917): 558; "Baby Welfare Movement in Montreal," Canadian Nurse 15 (January 1919): 1529.

46 Ada M. Whyte, "Public Health Nursing, Its Place in the Public Health Movement," Public Health Nursing Quarterly 5 (July 1913): 70. Also see, Rima D. Apple, " 'How Shall I Feed My Baby?': Infant Feeding in the United States, 1870-1940," (Doctoral Dissertation, University of Wisconsin, 1981), p. 195; 260; 267; 274; 318. Although this author's references to nurses' involvement in infant feeding were based on the medical and popular literature and were limited to brief comments, these comments are supportive of the active, interested involvement of nurses.

47 Alice L. Ketridge, "Infant Feeding," American Journal of Nursing 14 (July 1914): 909-910.

48 Sister Mary Therese, "Infant Feeding," American Journal of Nursing 24 (February 1924): 370.

49 Therese, "Infant Feeding," p. 370.

50 Hattie B. Innis, "Division of Child Hygiene, Vancouver Department of Health," Canadian Nurse 19 (July 1923): 404.

51 Carl G. Leo-Wolf, Nursing in Diseases of Children (St. Louis: C. V. Mosby Company, 1918), pp. 96-97; John C. Baldwin, Paediatrics for Nurses (New York: D. Appleton & Company, 1924), p. 47.

52 Bessie Ingersoll Cutler, Paediatric Nursing: Its Principles and Practice (New York: MacMillan Company, 1923), p. 133.

53 Mathilda Carlson, "Breast Feeding in Private Practice Under Ideal Conditions," Archives of Paediatrics 38 (September 1921): 570-571.

54 Helen Marion Warfield, "Infant Feeding," *American Journal of Nursing* 5 (January 1905): 236-237.

55 Helen MacMurchy, "The Birthright of the Baby," *Canadian Nurse* 10 (June 1914): 327. Also see the following articles for further information related to medical influence on the nursing management of breast feeding. Robt. F. Rorke, "Infant Feeding," *Canadian Nurse* 12 (February 1916): 67; Edith Haslem, "The Establishment and Re-establishment of Breast Feeding," *Canadian Nurse* 17 (August 1921): 492-495.

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57 Clara S. Weeks-Shaw, *A Text-Book of Nursing For the Use of Training Schools, Families, and Private Students*, 2nd ed. (New York: D. Appleton & Company, 1901), p. 304; Warfield, "Infant Feeding," p. 230; Therese, "Infant Feeding," p. 370.

58 Warfield, "Infant Feeding," p. 230.

59 Ketridge, "Infant Feeding," p. 910.

60 Weeks-Shaw, *Text-Book of Nursing*, pp. 304-305; Fullerton, Obstetric Nursing, p. 191; Cutler, *Paediatric Nursing*, pp. 143-144; Baldwin, *Paediatrics for Nurses*, pp. 51-54.

61 Warfield, "Infant Feeding," p. 231; Sister Amy, "Artificial Feeding of Infants," *American Journal of Nursing* 7 (April 1907): 521; Ketridge, "Infant Feeding," p. 911; Therese, "Infant Feeding," p. 370; Cutler, *Paediatric Nursing*, p. 146; "The Baby," *Canadian Nurse* 3 (August 1907): 417.

62 Goodnow, First-Year Nursing, p. 274; Isabel Hampton-Robb, *Nursing: Its Principles and Practice for Hospital and Private Use*, 3rd ed. (Toronto: J. F. Hartz Co., 1910), p. 458; Helen G. Churchill, "Baby Hygiene Nursing," *Canadian Nurse* 13 (July 1917): 357; Smith, "Child Welfare," p. 594.

63 Charlotte A. Aikens, *Clinical Studies for Nurses: A Text-Book for Second and Third Year Pupil Nurses and a Hand-Book for All Who are Engaged in Caring for the Sick*, 3rd ed. (Philadelphia: W. B. Saunders Company, 1916), p. 265.

64 Ketridge, "Infant Feeding," p. 911.

65 Goodnow, *First-Year Nursing*, p. 275; Amy, "Artificial Feeding," p. 523; Aikens, *Clinical Studies for Nurses*, pp. 265-266; Baldwin, *Paediatrics for Nurses*, pp. 60-61; 64; Smith, "Child Welfare," p. 594; Churchill, "Baby Hygiene Nursing," p. 357; MacDonald, "Babies' Dispensary Guild," p. 559; "Child Welfare Work in Kingston," *Canadian Nurse* 16 (February 1920): 101; Chalmers, "Care and Feeding of Babies," p. 362; Susan C. Francis, "The Milk Laboratory, Children's Hospital of Philadelphia," *American Journal of Nursing* 24 (September 1924): 949-955.

66 McClelland, "Milk Fund Association Nursing," p. 20.

67 Warfield, "Infant Feeding," p. 233; Amy, "Artificial Feeding," p. 524; Baldwin, *Paediatrics for Nurses*, pp. 60-61; Cutler, *Paediatric Nursing*, pp. 151-153.

68 Fullerton, *Obstetric Nursing*, pp. 204-205; Ketridge, "Infant Feeding," p. 911.

69 Weeks-Shaw, *Text-Book of Nursing*, p. 305; Hampton-Robb, Nursing, p. 460; Aikens, *Clinical Studies for Nurses*, p. 267.

70 Josephine L. Breed, "Infant Feeding," *Nurses' Journal of the Pacific Coast* 4 (December 1908): 544; Cutler, *Paediatric Nursing*, p. 156.

71 Ketridge, "Infant Feeding," p. 914; Aikens, *Clinical Studies for Nurses*, p. 269; Cutler, *Paediatric Nursing*, pp. 154-155; Baldwin, *Paediatrics for Nurses*, p. 69.

72 See, for example, Leo[illegible]tine Cremerieux, "Milk Station Work in Pittsburg," *American Journal of Nursing* 10 (November 1909): 111; Mary F. MacDonald Carter, "The Nurse's Part in the Campaign for Reduction of Infant Mortality," *Trained Nurse and Hospital Review* 48 (February 1912): 77; George W. Goler, "Nurses' Work in Milk Stations," *American Journal of Nursing* 4 (March 1904): 422; L. Emmett Holt, "Infant Mortality, Ancient and Modern: An Historical Sketch," *Archives of Paediatrics* 30 (February 1913): 907.

73 With regard to the number of milk depots in the cities mentioned, see Allan Brown, "Infant Mortality," *Canadian Medical Association Journal* 4 (August 1914): 700-701.

74 Carter, "Reduction of Infant Mortality," pp. 77-78; Cremerieux, "Milk Station Work," p. 111; Elisabeth Shaver, "How One City Saves Its Babies," *American Journal of Nurses* 11 (April 1911): 546-548; McClelland, "Milk Fund Association Nursing," pp. 18-21; M. E. Hanna, "Clean Milk for Babies," *Canadian Nurse* 7 (July 1911): 348-349; Smith, "Child Welfare," pp. 593-594; MacDonald, "Babies' Dispensary Guild Guild," p. 558; "Child Welfare Work in Kingston," p. 101.

75 Shaver, "How One City Saves Its Babies," p. 546.

76 Innis, "Division of Child Hygiene," p. 401.

77 McCune, "How Certified Milk Lessens Infant Mortality," p. 22; McClelland, "Milk Fund Association Nursing," p. 19; Smith, "Child Welfare," p. 594; Churchill, "Baby Hygiene Nursing," p. 355; "Child Welfare Work in Kingston," p. 101.

78 Cremerieux, "Milk Station Work," p. 111; Shaver, "Saving Babies," p. 547.

79 Alice P. Goodwin, "Nursing Treatment of Infantile Diarrhoea," American Journal of Nursing 7 (June 1907): 694; Frances A. Myles, "Infantile Diarrhoea," American Journal of Nursing 14 (June 1914): 712; H. B. Cushing, "Infant Feeding in Summer Diarrhoea," Canadian Nurse 11 (October 1915): 594; Hampton-Robb, Nursing, p. 470.

80 Carter, "Reduction of Infant Mortality," p. 78.

81 George W. Goler, "Nurses' Work in Milk Stations," American Journal of Nursing 4 (March 1904): 422.

82 Victorian Order of Nurses Annual Report, 1909, p. 39; Hann, "Clean Milk for Babies," p. 349.

CHAPTER IV

SUMMARY AND CONCLUSIONS

As indicated in the preceeding chapters, the excessively high infant mortality rates of the late nineteenth and early twentieth centuries were the cause of much concern. Additionally, it appears that there was a close association between the number of infant deaths and infant feeding practices at that time. Throughout the early part of the nineteenth century the alarming number of infant deaths was considered unfortunate and inevitable. However, toward the end of the century, when it was recognized that much of this waste of life was preventable, physicians identified themselves as best suited to remedy the situation. Regardless of having little more knowledge related to infant care—specifically, infant feeding—than did mothers or nurses, physicians were not discouraged from adopting an authoritative position.

Although it was apparent that the infant feeding problem was fundamentally that of using contaminated cow's milk for infants who were not breast fed, medical remediation involved a number of complex interventions, none of which ensured the widespread availability of clean milk for infant feeding. Physicians were interested in developing a scientific basis for infant feeding, hence their approach to the problem focused on laboratory and clinical work. Even though it was well recognized within the medical profession that at the basis of the infant feeding problem was a milk supply heavily contaminated with bacteria, had the initial solution to the problem simply involved the widespread distribution of pure milk, physicians may not have had the opportunity to establish themselves as primary authorities in all aspects of infant feeding.

Some of the methods of intervention introduced by physicians served a useful purpose by contributing to a broader understanding of infant dietetics. However, as was often the case, the impact of medical intervention was somewhat limited. For instance, the percentage system and laboratory feeding facilitated complete medical control over what a particular infant was to be fed but provided only infants from the better-off classes with clean, adequately modified milk. Similarly, certified milk gave the medical profession considerable control over the general milk supply, yet provided clean milk only to those who could afford to pay the high cost of purchasing this milk. In other words, both Rotch with his percentage system and laboratory feeding, and Coit with his certified milk, while being adamant about medical control of infant feeding, had limited impact on the problem as a whole. Although both physicians recognized that the milk used for infant feeding should have been pure, their particular methods of intervention, while facilitating medical control, made pure milk for infant feeding available to only a very small percentage of the population. Other physicians, whether supporting the use of laboratory milk, certified milk, milk modified, sterilized or pasteurized in the home, breast milk, or proprietary infant food, as with Rotch and Coit, also indicated that medical control of infant feeding was necessary.

While there is evidence in the literature that nurses were concerned about infant mortality and the difficulties associated with infant feeding, and that they in fact played an active and important role in overcoming these difficulties and thus helping to lower the death toll, their position was subordinate to that of physicians. Although nursing education programs involved both the theory and practice of infant feeding, greater emphasis was placed on the practical element. Additionally, nurses' theoretical knowledge was based on the teachings of the medical profession, and, in fact, whatever physicians had to say on the topic of infant feeding, for example, appears to have been accepted by nurses. Thus, whether nurses were involved in encouraging mothers to breast feed or assisting them to overcome the difficulties associated with bottle feeding, they did so under the direction of the medical profession because they believed that it was their professional duty as nurses to do what physicians said they should do.

However, despite the opinion of physicians that nurses lacked the knowledge and skill necessary to undertake, without medical direction, the care and feeding of infants, their contribution to the resolution of the infant feeding problem was significant. Nonetheless, their lack of a knowledge base exclusive to nursing practice, and their "inferior" position as women, prevented them from gaining autonomy as practitioners, and thus from occupying anything other than a subordinate position to that of physicians. On the other hand, medicine was a male dominated profession evolving within a male dominated society. Consequently, medical dominance was accepted by nurses as a necessary element in their professional lives.

The foregoing study of medical and nursing involvement in infant feeding indicates that the interventions of physicians appear to have placed infant feeding in the hands of the medical profession and consequently facilitated the establishment of paediatrics as a medical speciality and thus placed child health care under medical jurisdiction. However, the evidence presented neither affirms nor denies the possibility that the various methods of medical intervention with respect to infant feeding were intended to place child health care in the hands of paediatricians or whether this happened as a natural consequence of those interventions. Certainly, there is evidence indicating that physicians desired and ultimately gained control of infant feeding, and in so doing facilitated the establishment of paediatrics as a medical speciality and consequently placed the health care of children under medical jurisdiction. But whether this outcome was the goal of the physicians involved with infant feeding or whether it was a consequence of that involvement remains unclear.

The analysis of the nursing literature indicates that nurses and nursing were not exploited by physicians. Because the nursing profession was developing and organizing at a time when women occupied an inferior position in society and because nursing education had a practical rather than a scientific orientation, nurses developed neither power nor authority over their own practice. The power and authority over nursing practice, as indicated in the examination of the respective roles of physicians and nurses in relation to infant feeding, lay in the hands of physicians, and nurses agreed that this should be the case.

The investigator hopes that a study of this nature will not only provide enlightenment with respect to earlier infant feeding practices and problems but will also enhance understanding of the professional relationship between physicians and nurses of a century ago, and thereby facilitate the generation of additional related research questions. For example, how does the socialization of women today compare with that of a century ago and, if in fact women now occupy a less inferior position in society, what effect has this had on the physician-nurse relationship and the continuing development of the two professions? And, given the significant advances made in nursing education over the past fifty years, are nurses in a professionally more advantageous position today with regard to exerting greater influence in the delivery of health care?

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